THE ENGINEERING AND MINING JOURNAL.

VOL. XVI.—No. 7.—FOURTH SERIES. NEW YORK, TUESDAY, AUGUST 12, 1873. PRICE 10 CENTS PER COPY.

On a Relation Subsisting between the Atomic Weights, Specific Gravities, and Hardness of the Metallic Elements.

BY a careful consideration of the atomic theory, the writer was, in 1865, led to the conclusion that, if the ordinarily received notions respecting atomic heat, atoms, &c., were correct, a relation would undoubtedly exist between the relative specific gravity, atomic weight, and hardness of any given element. Many difficulties were encountered before any definite results were attained, owing principally to the difficulty of obtaining a definite scale of hardness, MOHR'S scale being found to be utterly unreliable for this purpose, as a softer body was found to be able to scratch a harder one, provided a certain angle of the scratching surface were presented to the surface to be scratched. Other methods were therefore studied, in order to get an idea of the relative hardness of bodies; two of these will be described, the writer having found them to yield reliable and corresponding results.

1. A solid cylinder of highly tempered steel, of 1 centimeter in diameter, is fitted so as to run easily into a collar formed into the transverse bar of a rectangular metal frame. This steel cylinder, to which the name "plunger" has been applied, is so constructed at its upper extremity that measurable pressures can be at will applied, by means of a hydraulic press, or otherwise. The surface of the cylinder is graduated with millimetric divisions, so that the operator can read off easily the distance to which the cylinder, or "plunger," is made to descend. The bed of the frame is a thick plate of cast-iron. A small cake of the metal to be examined is placed on the iron bed directly under the plunger, this being raised to admit of its introduction. The operator now notes, by means of the scale on the plunger, the height at which it stands, and pressure is then applied until the plunger has descended, say, 1 centimeter. The pressure required to effect this is now noted,* and other cakes of different metals subjected to the same treatment, the pressures necessary to produce 1 centimeter of indentation being carefully noted in each case. These different pressures are in direct proportion to the hardness of the metal operated on.

2. This method, though perhaps not so exact as the preceding, is very useful in deciding the hardness of such metals as are brittle. It consists in mounting a soft iron disc on a lathe, and imparting to it a fixed invariable velocity. The metal to be tested is then applied to the edge of the disc, and pressed against it with a constant pressure. The *time* required to cut a certain depth will be in proportion to the hardness of the metal examined, and this irrespective of its tenacity or brittleness.

Another point which rendered these experiments difficult was the almost absolute impossibility of obtaining some metals in a state of perfect purity, and the writer has noted with astonishment the extraordinary power which a mere trace of another metal has, in causing the hardness of a given metal to vary, sometimes increasing, and at others, diminishing this property to an unexpected extent. Great care has, however, been taken in the cases mentioned below; and, although other metals have been operated upon, the results are not given, as the metals were in a state of doubtful purity; hence the results might be misleading. Column 1 gives the sp. gr. of the metal (and this was actually verified in each case); column 2 gives the atomic weight; column 3 gives the relative hardness as deduced by calculation (by dividing the number denoting the sp. gr. by that denoting the atomic weight); and lastly, column 4 gives the hardness as obtained by actual experiment, but reduced for facility of comparison to the same standard as column 3. It may not be out of place to remark that the temperature at which these experiments were made was 60° F.

Name of Body Examined.	Specific Gravity.	Atomic Weight.	Hardness† Calculated.	Hardness by Experiment.
Manganese	8·013	55·0	0·145690	0·145600
Cobalt	8·5	58·8	0·144559	0·145000
Nickel	8·279	58·0	0·140790	0·141000
Iron	7·7	56·0	0·137500	0·137500
Copper	8·66	63·4	0·136377	0·136000
Palladium	11·8	106·6	0·110694	0·120000
Platinum	21·5	197·4	0·108966	0·110655
Zinc	7·0	65·2	0·107692	0·107700
Indium	7·277	74·0	0·098337	0·098400
Gold	19·3	197·0	0·097969	0·097900
Silver	10·4	108·0	0·096296	0·099000
Aluminium	2·25	27·4	0·082116	0·082120
Cadmium	8·6	112·0	0·076785	0·076000
Magnesium	1·743	24·0	0·072625	0·072620
Tin	7·2	118·0	0·061881	0·065090
Thallium	11·862	204·2	0·057405	0·056500
Lead	11·38	207·0	0·054975	0·057000
Sodium	0·934	23·3	0·040085	0·040000
Calcium	1·578	40·0	0·039450	0·040500
Potassium	0·865	39·15	0·022094	0·023000
Diamond	3·5	12·0	0·291666	0·300960

* By means of a manometer.
† Equal to sp. gr. divided by atomic weight.

A glance at these figures will show the reader how nearly the theoretic result approaches to that of actual trial. The writer believes that, by a comparison of the hardness and specific gravity, we have another method, besides that of atomic heat, for checking the atomic weight of such metals as are doubtful in this respect. For this reason he prefers the figure 74, as denoting the atomic weight of indium, to that of 75·63, as it is more consonant with the hardness and specific gravity of this metal.

It is with much diffidence that the writer lays these results of his experiments before the reader, as he is aware that his appliances are very rough; but he trusts that they have yielded results sufficiently conclusive and interesting to merit further research in this direction.—S. BOTTONE in the *English Mechanic*.

Boiler Inspection in Hartford.

The importance of boiler inspection in this, as in all countries which rejoice in the possession of large industries, may be seen from the following details of one month's work of the Hartford Boiler Inspection and Insurance Company: During the month 1237 visits of inspection were made, and 2386 boilers examined—2017 externally and 724 internally; 168 were tested by hydraulic pressure. The defects in all discovered were 1062, of which 218 were regarded as dangerous. These defects were in detail as follows: Furnaces out of shape 29—8 dangerous. Fractures 59—23 dangerous. Burned plates 34—18 dangerous. Blistered plates 133—32 dangerous. Deposit of sediment 173—25 dangerous. Incrustation and scale 197—19 dangerous. External corrosion 62—10 dangerous. Internal corrosion 18—9 dangerous. Internal grooving 12—4 dangerous. Water gauges defective 58—7 dangerous. Blow-out defective 17—1 dangerous. Safety valve overloaded 14—2 dangerous. Pressure gauges defective 180—24 dangerous. Without gauges 135—8 dangerous. Deficiency of water 9—3 dangerous. Brace and stays broken 29—12 cases place the boilers in dangerous condition. Boilers condemned as unsafe to run 8.

On the Decomposition of Metallic Carbonates by Heat.

BY L. JOULIN.

The substance, as dry as possible, is placed in a tube of glass 2 cubic metres in diameter, to the ends of which were fused at right angles two narrower tubes communicating, the one with a syphon-gauge, and the other with Alvergniat's mercurial pump, by means of which a vacuum can be formed, and the gas collected. A bulb filled with chloride of calcium had been arranged between the syphon-gauge and the decomposition-tube, in order to absorb the last traces of moisture which may exist in the substance. The space for gas to collect is 197 c.c. The part of the tube containing the substance is immersed in a bath of oil, the temperature of which is kept constant by means of a Friedel's regulator. The substance having been placed in the apparatus, a current of dry carbonic acid is passed over it for twelve hours. Then the gauge is filled, and the temperature of the oil-bath having been raised to 80° C., two exhaustions were made before observing the tensions, in order to eliminate all the gas that the pulverulent substance might have condensed.

Carbonate of manganese was produced by the reaction of equal equivalents of chloride of manganese. It was washed very many times by decantation, and dried at 66°, and cooled in an exsiccator under a bell-glass. 16 grms. of the precipitate were successively exposed for several hours to the temperatures 100°, 150°, 200; 100°, 100, 300°; each heating being preceded by a longer or shorter cooling. The results were that the carbonate of manganese was very perceptibly decomposed at 70°C. Up to 200°C. the decomposition presented the two characteristics of the phenomenon which DEVILLE has named dissociation. That is, at a given temperature the tension of the carbonic acid reaches a value (215 m.m. at 150°), which remains constant within the limits of time of the operation, and that during the period of cooling the tension of the gas returns by degrees

to its primitive value in consequence of the re-combination of the carbonic acid and protoxide of manganese. The limit of tension seems to decrease with the temperature. It is feebler at 200° than at 150°.

From 250° to 300° the elastic force of the carbonic acid has increased constantly to 2 atmospheres. As the pressure-gauge did not go further, it was supposed that complete decomposition was commencing, a view confirmed by the fact that during the period of cooling the re-absorption was very slight. The substance, which remained white up to 200°, was turned brown at higher temperatures, the protoxide of manganese having decomposed a little of the carbonic acid in order to convert itself into sesquioxide, as DEBRAY found was the case with carbonic acid and the protoxide of iron. On analysis it was actually found that a part of the gas consisted of carbonic oxide. The substance successively heated to 100°, 150°, 200 was, after cooling, heated anew to 100°; and it was found that at this temperature the tension limit of the gas was less than the half of what it had been when the substance was heated to 100° for the first time (315 m.m.); in the third heating the limit remained the same (145 m.m.) as in the second. This phenomenon can only be explained by molecular changes which the carbonate of manganese had undergone in the successive heatings. Thus such pulverulent bodies would suffer a series of pseudo-allotropic modifications.

Decomposition of Carbonate of Silver.—The decomposition of the oxide of silver was first studied. It was found that up to 250° the tension of the oxygen yielded by the oxide is very feeble, lower than 15 m.m. The decomposition of the carbonate can, therefore, be studied up to 200°. Complete decomposition takes place between 250° and 300°.

The study of the decomposition of the carbonate of silver has given results decidedly different from those yielded by the carbonate of manganese.

Lead.—Experiments made upon 13 grms. of cerussite (native carbonate of lead) have proved that the tension of the carbonic acid coming from its decomposition, very feeble (below 30 m.m.) at 150°, rises to 75 m.m. at 250°, and increases very rapidly at 300°, the temperature of complete decomposition, which at a pressure of 2 atmospheres was reached in two and a half hours.

All these experiments, which show the extreme instability of metallic carbonates, throw some doubt as to the analyses upon which H. ROSE founded his theory of the hydrocarbonates. He has given no indication of the manner in which he dried his precipitates. The author concludes that at temperatures higher than 50° or 60° there is no security against the disengagement of carbonic acid.—L. JOULIN in *Chemical News*.

Mineralogical Notes on Utah, California and Nevada, with a Description of Pricelte, a New Borate of Lime.

Continued from Page 82.

6. *Ulexite.*—The boronatrocalcite of Ulex proves to be an abundant mineral in Nevada and Arizona. The specimens of this species which I have examined are from near Columbus, Esmaralda County, Nevada, where it occurs in beds of considerable extent, mixed with sulphate of soda and gypsum. It is found in round masses, as large as the fist, and larger, which, when broken, show the fine fibers of silky luster not to be distinguished from the *tiza* of Peru. This species, it is said, occurs abundantly in the Arizona desert, and also near Wadsworth, Nevada, much mingled with dirt.

Near Columbus, Nevada, they have likewise found large quantities of borax diffused in the soil, and Prof. PRICE informs me (June 6, 1873), "that all the borax produced there is obtained by lixiviating the soil and crystallizing out the borax in the usual way. I have been informed by trustworthy parties that they can manufacture at least forty tons of commercial borax every day; the difficulty is to find a market for so much."

About twenty miles West of San Bernardino, California, is the so-called "Cane Spring District," where ulexite is found over an area, said to be about ten miles in width by fifteen in length. The surface of the ground is covered with efflorescent salts, commonly known as "alkali," beneath which the borax salts (chiefly *ulexite*) are found, at a depth of a few inches, when they exist at all. As these "alkaline" wastes are now attracting attention from the commercial importance attached to the borax salts we may hope to obtain yet other contributions of interesting species. The saline salts removed in obtaining the borax salts recur again after an interval of time, during which the process of solar evaporation in a rainless region brings up by capillary action from a lower stratum fresh portions of the saline solutions. It is a fact long familiarly known to travelers in these desolate regions, that while the lagoons, where any exist, contain only water too strongly saline to be drank, that wells sunk to a moderate depth in the saline soil afford water which can be used. This water is only a more dilute solution of the same salts, which on reaching the surface by capillarity, form the peculiar "alkali" incrustations of the desert.

7. *Borax.*—On the eastern slope of the Sierra Nevada, not far from Walker's pass, borax is found in what appears to be the bed of an ancient lake, large crystals of tinkal having been found in the hardened mud, like the well known crystals of borax found in the mud of Clear Lake in California. But by far the largest quantity of the borax exists mixed with other salts, incorporated in a sort of induration mud from which it is extracted by lixiviation.

I have examined several samples of this material which Prof. PRICE has kindly sent me. One of them, by his assay, contains about half its weight of borax. It is a light gray clay-like looking body, with a strongly saline and alkaline taste, effervesces with dilute hydrochloric acid, and tinges the flame of alcohol green. They are all alike in reacting alkaline, and for sodium, boracic acid, chlorine and sulphure acid. The portion insoluble in water is attacked by dilute hydrochloric acid with effervescence, and contains alumina, lime, a little ferric oxide and magnesia. Minute crystals of gypsum exist in some of them, but no gaylussite, glauberite or boracite could be detected. Similar deposits containing borax exist in Panamit and Death's Valley, in Lower Nevada, which desolate districts have yet to receive a careful scientific examination, for which, in Prof. PRICE's opinion, they offer an interesting but certainly not very inviting field. There are few parts of the earth's surface where human life and endurance are more severely taxed.

8. *Chrysocolla.*—This species, in specimens of unusual size and beauty, is found in a vein, or heavy deposit, of thirty to forty feet in thickness, in the Railroad mining district, Elko County, Nevada. Above one hundred tons of it were sent last year to the Revere Copper Company, where it yielded 28½ per cent. of copper.

9. *Compact Anglesite.*—This variety of anglesite occurs in large quantity at the Union mines near Cerro Gordo, Inyo County, California, in an Alpine region about twenty miles east of the Sierra Nevada mountains, and at an elevation of more than 8,000 feet above tide. The mineral vein, or ore deposit, occurs in limestone and makes its appearance on the west slope of the mountain (which rises some thousand feet or more higher than the vein). It was indicated at surface by a few boulders or isolated masses of galena, which on exploration ran into a nearly continuous mass of galena mixed with a reddish-brown sand colored by sesquioxide of iron, but without quartz or epigene species derived from lead. Singularly enough, the carbonates of lead occur *below* the anglesite, mixed with the latter species and with galena. At the depth of 600 feet from surface, the ore course is about fifty feet wide, the entire absence of water at that depth and above being a noticeable fact, in considering the paragenesis of species. Water is brought by mules and Indians from a distance of some miles, to supply the hoisting machinery and other needs of the mine, at a cost of 10 cents per gallon, and is economized by a careful condensation.

This anglesite often includes unchanged galena. It is of a gray to a grayish-yellow color, sometimes dark, or with seams of yellow covered with druses of small crystals of anglesite, which are quite colorless, brilliant and transparent. The masses are banded like agates. Its density is 6·08, and its pyrognostic characters are those of anglesite. It contains on an average of mining samples about 55 ozs. of silver to the ton of 2000 lb., which is materially less silver than is found in the unchanged galena. The "bullion" (silver lead) of this mine as sent to market contains about 120 ounces of silver to the net ton. My informant for these economical facts is Mr. F. F. THOMAS, a graduate in Arts and Science at Yale, who is in charge of the smelting works at these mines.*

10. *Platinum and Iridosmine.*—Since the publication (this Jour., v, 384) of my note on the crystalline sands of the Cherokee gold washings in Butte County, California, I have obtained, through the kindness of Mr. G. A. Treadwell, who at my suggestion gave the proper directions, samples of the heavy sands which accompanied the "clean up" of the gold to the last stage of concentration before going into the melting pot. These heavy sands I find to be largely composed of scales of platinum mixed with yet more abundant iridosmine. When the adhering mercury and other foreign matters which disguise the true character of the platinum residues, are removed by a slight washing in acid, the beauty of these species is seen, and it is quite easy to select each by the aid of a glass. A few minute zircons and brilliant microscopic crystals of chromite (?) were selected from the sample of about 25 grams which I received. The search for laurite and the anomalous mineral believed by Dr. Genth to be new (this Jour. II. 246), which he described as occurring among sands from California, in 1853, was not successful.

Mr. GLASS, the resident manager, informs me that the platinum and its associate minerals are quite abundant at Cherokee, but as the quicksilver does not amalgamate them they have no means of escape from the mechanical force of the stream which washes away much the larger part, thus entailing a loss which there is no means now known to prevent.

Platinum and iridosmine were very early observed in California by BLAKE and others, especially among the sands of the surface placers near the sea, on the northern coast and in Oregon. But I believe this is the first notice of their being found in the older deep placers now so extensively worked by the hydraulic process.

The "Black Sands" of the Cherokee deep placer washings I find to be composed chiefly of *chromites*. The magnet selects quite sparingly a few crystals and masses of *magnetite*, some of them being also strongly magnetic. An occasional mass of brown iron (*limonite*) occurs, giving off water in the tube, becoming magnetic by heat, and reacting only for iron. The search for *ilmenite* resulted in finding only chromite, with its well-marked reactions. It is highly improbable but that ilmenite exists, but I have not yet, after some time and much pains, succeeded in finding it. The mass of sands searched by an exploring-glass, discloses some other species besides the abounding zircons, among which the most conspicuous is *rutile* in minute prisms of a fine red color, transparent, sometimes doubly terminated, but rarely compounded; 68 of these little crystals of rutile weighed only 58 milligrams; garnets, epidote, and a few minute fragments undetermined are sparsely found. We may therefore enumerate the mineralogy of the Cherokee washings, so far as known, as yielding gold, platinum, iridosmine, diamond, zircon, topaz, quartz in several varieties, chromite, magnetite, limonite, rutile, pyrite, almadine garnet, epidote. A further search on larger samples of the sands

* The compact anglesite from Arizona, described by Prof. BRUSH in this Journal, (III, v, 421) is not distinguishable from the Cerro Gordo mineral.

will undoubtedly reveal yet other species. The matrix which has furnished most of the species enumerated (the gold and platinum metals probably excepted), is probably syenite, boulders of which are among the frequently recurring factors of the gravel mass.

11. *Diamonds in California.*—About twenty well-formed crystals of diamond have been picked out of the "sluices" in the deep placer workings at Cherokee, Butte County, since the attention of the miners has been called to the existence of this gem in such situations. One of these diamonds which I have examined weighs about 2¼ carats, and is of a faint yellowish color, with curved faces, and the form of fig. 58, in Dana's Mineralogy. Some of these stones were of a pure water, and have been cut and set as gems.

12. *Sands of the Arizona Desert.*—The search for "diamonds," "rubies," and "emeralds" in 1872, led to the sending of several expeditions into Arizona and Southern Nevada. I have had, by the kindness of Mr. GEO. A. TREADWELL, an opportunity of examining a portion of the findings of one of these parties, which explored a region about eighty-five miles north-west of Fort Defiance in Arizona. The region is described as one of porphyritic and other eruptive rocks. The "rubies" are garnets, some of very fine color and good size, but whether pyrope or common garnet, an analysis only can determine. Some of them, cut in San Francisco, which I have seen, compare well in color and beauty with the Bohemian stones. The "emeralds" are chrysolite, too faint in color to be used as gems. The "diamonds" are quartz, some opaline, others hyaline, and all smoothly polished. In addition, I find the alalite variety of pyroxene, fluorite (white), magnetite, ilmenite, oligoclase and jasper.

Experiments with Pneumatic Tubes.

Now that Congress is establishing a pneumatic tube in Washington, the following notes of experiments in Paris, and which we take from *Engineering*, are in point:

In London, as in Paris, the telegraphic executive make use, to a large extent, of pneumatic tubes for the transmission of messages, which, packed in suitable cases are driven through the tubes under pressure, and it not unfrequently happens that one of these cases becomes arrested in its course, causing an obstruction, the locality of which it is very difficult to ascertain.

M. BONTEMPS, director of pneumatic telegraphs in Paris, has recently devised an ingenious method of ascertaining with considerable precision the locality of the block. Before describing it we may notice briefly the system now in use for the same object which is based upon Mariotte's law.

When an obstruction takes place, a reservoir containing a volume, V, of air, of a given pressure, H, is put in communication with the obstructed line. After the connection the final pressure, H¹, is measured in the reservoir, and calling the volume of the tube between the reservoir and the point of stoppage, X, Mariotte's law gives the following:

$$V H+(X\times h)=(V+X) H^1$$

from which X can be obtained and consequently—the section of the tube being known—the situation of the obstacle. In this formula, h, is the atmospheric pressure. This method is theoretically correct, provided that all measurements, both for volume and pressure, are taken with absolute precision, and that the usual corrections are made. But in practice two causes diminish this precision; these are in the first place, the unavoidable losses which falsify the result; in the second the instruments in use only allow of an approximate reading of pressures. After having calculated the distance to the obstacle by means of the formula, an opening is made, and a probe is introduced into the tube to find its true position. If the calculation is correct to within 60 ft. a second opening will be sufficient. But if the distance is greater the probe will be too short, and other holes are found necessary. Experiments and records dating from 1866 show that on an average three openings are required to clear each block.

The system of M. BONTEMPS, more precise, and consequently more rapid in practice, is founded on the principle applied by M. REGNAULT in his inquiry into the action of sound waves in tubes. At the free extremity of the tube an elastic membrane is placed, and its alternate distensions are registered on a revolving cylinder by means of electricity. A wave is produced in the tube by detonation of a pistol placed near the membrane. This wave travels through the tube at a speed of 333 metres per second, and strikes against the obstacle; there it is reflected back passes through the tube in a contrary direction and inflates the membrane. This places the first mark on the revolving cylinder. The sound wave sent back by the membrane against the obstacle is reflected a second time, and a second mark is obtained on the cylinder. To determine the distance between the membrane and the obstacle, it will only be necessary to know the interval of time that has elapsed between registering the two marks on the cylinder. The half of this interval (reckoned in seconds) multiplied by 333, gives the distance required. The time is calculated by an ordinary chronograph, with three tracing points worked by a magnetic needle.

The first is placed in the circuit, which is closed by the alternate distensions of the membrane.

The second answers to an electric governor, and marks the seconds on the cylinder.

The third divides the second into periods of equal duration to the second, by means of the pulsation of an electric needle.

These vibrations are not absolutely isochronous, but are sufficiently so for the object in question, or if it were thought necessary to have the isochronism perfect, the vibrations of a diapason could be used. The following example illustrates the operation of the instrument: An obstacle is placed on a line at a known distance, say, of 62 metres. The needle oscillates 33 times per second, the interval included between the two marks determined by the pistol-shot corresponds to 120 oscillations, and the distance of the obstacle will be

$$D=\tfrac{1}{2}\times 330\times\frac{12}{33}=60 \text{ metres.}$$

The approximation obtained is thus 2 metres. But in practice this method gives an approximation of 3 metres, and consequently only one opening in the pipe is required.

The ingenious application of scientific laws explained above may not find an application in Washington, for the scheme there is of course a patented one, and the inventor means to roll spheres through his tube. These, we imagine, will not stick, or ought not to, and we therefore look for perfect smoothness in operation. We believe, however, there have been some difficulties in laying the tube, and it is to be presumed that the inventor now takes calmer views of his scheme of a pneumatic tube between New York and Chicago with great spheres plunging through it at the rate of 500 miles an hour.

The Blast Furnace as Applied to the Cupola of the Iron Founder.

By ALEXANDER LAIRD.*

Since the introduction of the cupola or blast furnace by FULTON, of Glasgow, in the year 1802 it has undergone but little change, either in form or proportions, and its adoption has now become general in almost all engineering establishments as being the most convenient and economical furnace for melting pig iron. The universality of its employment suggests to us either its perfect adaptability to the purpose for which it is required and used, or a degree of laxity, or an indifference to efforts at improvement on the part of engineering generally which is not often met with.

That it fulfills to a very great extent the requirements of the iron founder and the engineer, is granted on all hands. Still the daily experience of its working as regards the qualities of the metal melted, and its own cost, suggests the need of investigation in a scientific direction, as to the possibility of its modification. Great diversity of opinion exists on this subject, and that not only in relation to the form and proportions of the furnace, but also as to increasing and improving the quantity and quality of the iron produced by its agency. The question of reducing the expense of the process is, of course, an important one in addition. Time will not permit me now to enter upon an enumeration of the various devices proposed or introduced for effecting these objects. Many of them have been of little scientific importance or value. In some instances they have been brought forward in the furtherance of particular views held by the proposer, or to uphold a patent in which he had a pecuniary interest. It is only of late that distinct ideas seem to have been formed and advanced on the subject. As a consequence, a great many experiments and tests have been made more or less valuable or accurate, and of greater or less importance. If the results of these had been gathered and collated, they might have been of much interest and value to engineering and metallurgical science. The isolated and desultory manner in which they have been made and obtained has rendered them useless to the interests of science, and they afford no general information of any real service.

We have already referred to the universality of the cupola for melting pig iron. It is now proposed to attempt an elucidation of the principles upon which the cupola furnaces are constructed and worked. Heat is most economically and best applied when used on the principle of being applied under the mass of the material to be consumed or operated upon. By this arrangement the air supplied to support combustion is made to pass through the material on its way upwards towards the furnace top. In the air-furnace, on the contrary, the fuel is never allowed to be in contact with the charges of iron, as the material is situated at the opposite extremity of the hearth. In the cupola the metal and the fuel are deposited in alternate layers upon each other, and thus become intimately blended and united in the course of the fusion and descent of the iron into the hearth. This latter condition will be sufficient to account for that superiority in point of economy which is acknowledged to exist in the cupola as compared with the air furnace.

When cupolas were first introduced into foundries, they were recommended for the great reduction they effected in the consumption and expense of fuel. It has already been explained that it is well adapted by its form and the disposition of fuel and material to work economically. No hesitation need now be felt in asserting, also, that this economy can be very much increased by raising the depth over the tuyeres; that is to say, by running up the cupola to a greater height, and filling up with more numerous and higher charges. The most intense heat is evolved first at the surface of the flame, or line of union between the gaseous combustible and the air; and, as on the cupola the surface extends over the whole lower stratum of the fuel, an immense quantity of heat is thereby generated. This being carried upwards with the intensely heated products of combustion, it becomes deposited in the mass of coke or fuel above. From the slow transmitting power of this substance, it is well able to retain what it receives. By these means it soon accumulates so as to become a magazine of heat of the most intense and dazzling brightness, while the body of the fuel being decomposed sinks down to replace that which has been consumed. It is well known that the point of fusion in a cupola or furnace of this kind, using the blast cold, is situated about two feet above the tuyeres. We can thus readily compre-

* Read at a meeting of the London Association of Foremen Engineers.

hend the importance of great height above the tuyeres. Indeed, the only limits to the increase of this height are those of stability, and the danger arising from irregularity in the working and position of the charges.

There is, it is true, one objection which is sometimes urged by iron founders against running up the wall of their furnace, and that is the increased labor and cost of raising the materials to the charge-hole of the furnace. This objection is not worth much in an age of mechanical skill, ingenuity and labor-saving. Why, even without mentioning the resources of applied mechanics, we could by the utilization of the waste heat and gases gain sufficient power to overcome this objection to increased height. Much more might be added in favor of high furnaces, and the advantages accruing thereby. As to the necessity of such improvements, it is made manifest by the daily experience of all who observe the vast volume of flame and heat belching from the tops of our cupolas, which higher walls and deeper and more numerous charges would assuredly prevent.

We have yet to deal with the higher and more recondite question to be considered, as to the kind or quality of metal in the cupola under the conditions we have just detailed. What, for example, are the influences resulting to the metal from its immediate contact both with the fuel and blast? By way of illustration, let us say, then, that it is impossible to conceive a more unfortunate and unscientific method for the purpose of producing a highly carburetted or soft cast iron than the arrangement adopted in the ordinary cupola, or blast furnace The melted metal, trickling as it does in drops or small rills in its descent to the hearth, must fall into, mix with, and be dashed about by the violent tornado of fresh air from the blow-pipe. Part of it may be protected by the coke, or escape between the tuyeres. Perhaps it may be cooled and oxydized, and, combining with the flux, melt into a brown glass. Part again will catch fire, burn and blaze with great violence, and, reduced to vapor, be carried up with the stream of air, to be again deoxydized by its passage through the carbon in the upper region of the furnace, or it may pass off at the top of the furnace. If to these we add the contingencies of the strong tendency possessed by cast iron to combine with oxygen at high temperatures, and its extreme inflammability, we shall at once see how readily these latter substances dissolve their union or cast iron partnership, if we may so call it, to form new unions of their own with the oxygen of the atmosphere. This oxidization of the iron not only produces a waste of from eight to ten per cent. of material in most cases, but produces a metal, which is at times both cold and thick—unless neutralized by the presence of an ample supply of superior carbonaceous fuel in the form of coke, so that the oxygen of the atmosphere may be thoroughly saturated and mixed before its reaching the iron, which is then rendered hard and stiff. It is a remarkable fact, and one worthy of observation, that softness of castings was a general complaint on the first introduction of the cupola—a complaint which has, however, now died out, and which gives no trouble to the iron founder of the present day who uses cheap and inferior fuel. The tendency of this combination, as already remarked, was to render the iron soft, and to make it very fluid when melted, so that it might run into the finest and most delicate mould.

Among the many contrivances introduced or adopted to overcome the oxidizing influence of the cupola form of furnace, one of the best and most successful is that of Mr. EICHHORN, which has been experimented with for some time with great success in Germany. The principle of this is, that the blast before entering the cupola is made to descend and pass through a mass of burning fuel. The temperature of the blast is raised, first by contact with the heated bricks, and secondly by radiation into the air chambers from the incandescent fuel; the third, and by far the most important and useful condition, is effected by its actually passing through the fuel.

In the earlier stages of cupola construction, considerable importance was placed on the influence of form and size. The horizontal interior section of all cupolas is circular, however different in other respects they may be, and the principal varieties of cupola may be arranged or classed in four divisions, founded on the form of the vertical section through the trunk.

First, those cupolas which contract from the earth upwards to the charging door. Secondly, cylindrical cupolas, or such as are parallel in section under the charging door. Thirdly, expanding cupolas, of which the sides widen from the neighborhood of the tuyere upward: and, fourthly, cupolas in which the form is a combination of two or all of these figures.

The first and two latter of these forms have become, for all practical purposes, extinct, while the second or cylindrical cupola has been universally adopted. This partiality is easily understood, for in charging parallel cupolas the fireman can more precisely distribute and regulate the proportions of his charge in accordance with the purpose he may have in view than he can in dealing with the tapering cupola.

In the former, the materials descend regularly without altering their arrangement, till they reach the neighborhood of the tuyeres, where the iron ought to be melted, and the unconsumed coke is pressed gradually and equally down to make way for the superincumbent charge. Thus the process goes on in a sure and well-ascertained manner, whereas, in the tapering cupola, the firemen are inconvenienced for want of space to deposit their charges, and the materials having to spread into the large expanse below the door, cannot do so equally, and thus, by an unequal mixture of material, the iron is unequally heated. But, to shorten this discussion, it may be said that the best and indeed the only true means of ascertaining the relative efficiency of various forms of cupolas, is to compare the relative quantities of fuel consumed with those of the iron melted. Economy of fuel and rapidy of fusion which generally accompany each other, are indeed the touchstone of excellence, and the test of efficiency.

The opinion has already been expressed that the cupola was well adapted, by its form and construction, to work economically, on account of its parallelism of section vertically, and that this economy is capable of indefinite extension by an increase of vertical depth over the tuyere. But the greatest source of waste inseparable from the principles and working of the cupola is the unavoidable loss of heat which takes place by radiation from the outside of the cupola, and long conduction through the hearth, the amount of such loss being in the ratio of its diameter, and i s vertical height. The loss at times is very considerable, and more so in the case of small furnaces, or when the inside lining is thin, and badly constructed. Indeed we have known an instance of this kind where the heat from radiation outside the casing of the furnace was greatly in excess of the thermometer's ability to register it with accuracy. This was on account of the excessively high temperature around the skin. The importance of retaining as much as possible of the fugitive heat to the charges, and preventing its escape from the furnace, whether it be from radiation or from the furnace mouth, ought to be fully recognized in the construction and management of a cupola. Natural and obvious as this condition is, there is nothing more common than to witness everywhere furnaces in use wherein these self-evident conditions appear to have been disregarded or ignored altogether. One effect of this, of course, is to cause an excessive expenditure of fuel and heat which simple mechanical expedients would have obviated and overcome. In reality it is impossible to over-estimate the value of a true knowledge of the principles and nature of combustion in furnaces; more particularly this is so in regard to those where the air is forced into the furnace by means of a blast like that of the cupola. The subject, however, is so prolific and complex that we cannot attempt to dispose of it within the limits of a single paper. It will be sufficient to enumerate a few of the more salient points, and then to leave the whole question for reflection and discussion.

Having referred to some of the various forms of furnace and their effects on the operations of smelting, it becomes our duty to refer also to two or three of the most favorable conditions of fuel and blast, viz. :—

From the nature of the cupola furnace, air should enter in sufficient quantities to maintain the necessary supply of heat, and that too at lateral apertures around the alternate layers or strata of materials and fuel, and these, as we have already seen, are arranged under the most favorable conditions when mutually acting and reacting on one another.

Regarding the quantity of fuel per ton of metal melted, there exists a great amount of uncertainty and misconception, and these would be difficult to remove or displace. In endeavoring to do so we should have to deal with the composition and the combustion of fuel. These are so exceedingly various that it would be quite impossible to give anything like a minute description of them.

The task is rendered yet more difficult by the introduction and substitution of cheap and inferior fuel now so common in some establishments, and which is owing to the exceptionally high price of coal. This circumstance overthrows the experience and data of former years, and hampers the efforts and ability of all interested and concerned in furnace economy.

We must now pass on from the question of fuel to that of the blast. Here again we find that there exists much uncertainty and many different opinions. For example, it has long been the belief of some ironfounders that a stiff, sharp blast, or, in plain language, a concentrated jet of air was indispensable in all cases to the economical management of a cupola. Such persons, in realization of their pet theory, contract the aperture of the tuyeres and increase the velocity of the blast. On the other hand, there are the disciples and advocates of a more open and diffused blast, who multiply the tuyeres and work them alternately in order that they may spread and diffuse the blast over the horizontal area of the cupola. These base their opinions on the results obtained from the air-furnace, where a chimney of a moderate height and proper dimensions is sufficient to generate a heat so bright and strong as to vie in brilliancy with the mid-day sun. They urge that the distribution of air with the material is calculated to produce a uniform application of heat throughout the whole area of the furnace.

For some time after the adoption of the cupola in cast-iron foundries, it was felt to be a desideratum to obtain a uniform and equal blast. Many schemes have been resorted to to effect this important end. The blast cylinder with a vessel inverted in water was devised, among other plans, but it had this drawback, that the air sent into the cupola was damp, and thus hardened the iron. Then the founder had recourse to a bored cast-iron cylinder, but the friction of the piston rendered its operations imperfect and incomplete. Another plan was that of having two cylinders working alternately and exerting an equal force. This was costly in construction, and afterwards required much power to work it. The summer of 1829 witnessed the introduction of the fan blast—at the instance of Messrs. JAMES and CHARLES CARMICHAEL—and then the cupola became the most perfect appliance for melting cast-iron which it seems possible to contrive or suggest. Its advantages were—first, with regard to saving o power as compared with the blast cylinder, for it sent double the quantity of air into the cupola. Secondly, that the blast was uninterrupted. Thirdly, owing to the great quantity of air injected with so perfect a regularity of force, the resulting metal was both softer and more uniform in quality than it had hitherto been; and fourthly, it effected a considerable saving of time in the process of melting.

Having already referred to the effects of compressed and diffused blast it will be well to bear in mind that a considerable variation in the pressure, and the quantity of the blast, is necessary to suit the different qualities of the fuel employed in melting furnaces. The variation of pressure is as much as from 1½ lb. to 3lb. per inch. the stronger blast being used for the more inferior coke. There is, in truth, no doubt that differences in the quality of the coke subjected to the action of the blast do, in some measure, account for separate preferences respectively held in reference to forcible and diffused blasts. There is, to my thinking, great necessity for regulating the quantity of force of the blast by some fixed rule, if that rule can be found.

THE COAL TRADE.

NEW YORK, August 6, 1873.

Business in anthracite is good and the breeze raised by the daily papers can have no effect but to increase the disposition of dealers to take what coal they want as early as possible. There is some little apprehension of an excitement which will send prices up, and the keen demand exhibited at the last auction sale, a demand which took the regulation of that *spontaneous* expression of the feeling in the market, directly out of its managers' hands and doubled the advance anticipated, is pointed to in proof of the danger. It cannot be doubted that even a moderate check to the production of anthracite would be sufficient to send the price beyond control. We doubt, however, if any such check will be experienced. Writers in the daily papers make regular weekly predictions of a strike and they usually include all the companies and the whole of Pennsylvania in the movement. The ground on which they base their expectations is short work in the collieries. The lessened production lessens the miners' earnings. There is some truth in this, for the increase towards 350,000 tons this year, is not enough to prevent short time in individual mines. But we doubt whether any pressing danger of a strike exists. The miners could only injure themselves by it, and injure themselves at the moment when an improving trade promises to entirely alter the complexion of things for the rest of the season. In spite of the assertions that the companies are secretly trying to foment a strike, we have no belief that such is the fact. The interest of all parties is to foster a steady brisk trade and large sales at the advancing rates.

The Associated Press agent at Wilkesbarre describes an explosion in the Diamond mine, of the Wilkesbarre Company, which he says "was caused by one of the men trying to brush back the damp with an open lamp." Two men were killed and two injured.

Bituminous.

Trade continues dull, as might be expected at this season, but prices are maintained.

A riot took place July 27 at the Church Hill Mines, in Ohio, in which Scotch and Welsh miners pitted themselves against Italians. The troubles had their origin in trades union quarrels during the long strike last winter.

Anthracite Coal Trade for 1872 and 1873.

The following table exhibits the quantity of Anthracite Coal passing over the following routes of transportation for the week ending, 1873, August 2, compared with the week ending August 3, 1872.

COMPANIES.	1872. WEEK.	1872. TOTAL.	1873. WEEK.	1873. TOTAL.
Phila & Reading R.R†	98,939	2,729,140	127,024	3,023,358
Schuylkill Canal	24,833	459,960	21,433	385,310
Lehigh Valley R. R.	61,866	2,039,045	57,850	2,052,812
Lehigh & Sus. R. R.	37,455	975,490	26,733	1,118,091
" " Canal	26,807	387,992	25,666	383,647
Scranton North	19,953	407,427	26,769	488,576
" South	38,716	1,266,531	38,072	1,284,224
Penn. Coal Co., rail	21,281	678,464	28,669	697,707
" " " canal	219	2,994	233	4,446
Del. & Hud Co. Canal	54,429	732,197	45,851	737,127
" " East	4,214	349,236	6,921	227,930
" " West	6,686	221,800	13,809	289,636
" " South	8,054	21,320	868	130,455
Shamokin	13,702	314,027	16,670	348,699
Trevorton	....	....	....	....
Lykens Valley Coal Co.	....	....	....	....
Wyoming North	....	....	....	....
Wyoming South	....	....	....	....
P. N. Y. C. & R. R. Co.	15,120	333,723	15,314	483,404
Williamstown Co'y	....	....	....	....
Big Lick Col	....	....	....	....
Total	435,874	11,152,348	441,925	11,589,892
1872			435,874	11,152,348
Increase			6,051	437,154
Decrease				

These figures are for the week and fiscal period commencing Nov. 30

† Less coal transported for Company's use and Bituminous coal.

Bituminous Coal Trade, 1872 and 1873.

The following table exhibits the quantity of Bituminous Coal passing over the following routes of Transportation for the week ending August 2, 1873, compared with week ending August 3, 1872.

COMPANIES.	1872. Week.	1872. Year.	1873. Week.	1873. Year.
C. & O. Canal	15,923	351,574	8,802	357,023
B. & O. R. R.	27,064	732,164	27,924	826,863
Penn. S. Line	....	.....	1,348	47,836
H. & B. T. R. R.	4,566	169,145	7,389	255,536
*Harrisburg & D	4,361	288,849	5,604	296,771
*L. V. R. R.	516	18,739	623	18,890
P. & N.Y.C. & R. Co.	6,976	228,113	6,837	193,232
Cumberl'd Branch Canal	5,818	117,474	3,129	67,906
" Railroad	316	10,841	327	57,061
Total	65,550	1,916,903	61,983	2,031,130
Decrease	3,567		....	1,916,903
Increase	....		....	114,127

Philadelphia & Reading Railroad and Branches.

COAL TONNAGE

For the Week ending Saturday, August 2, 1873.

BY RAILROAD—ANTHRACITE.

PASSING OVER MAIN LINE AND LEB. VAL. BRANCH.

	Tons. Cwt.
From St. Clair	34,214 01
" Port Carbon	4,194 16
" Pottsville	2,110 11
" Schuylkill Haven	33,082 03
" Pine Grove	6,611 11
" Tamaqua	13,063 14
" Harrisburg	....
" Dauphin	7,451 14
Total	101,479 10

FOR SHIPMENT BY CANAL.

Passing Frackville Scales	8,905 06
" Mill Creek "	1,870 11
" Schuylkill Valley Scales	313 16
" Mt. Carbon "	1,198 06
" Cressona "	6,897 08
" Pine Grove "	621 13
" Tamaqua "	1,091 18
Total	18,848 18

SHIPPED WESTWARD VIA CATAWISSA AND WILLIAMSPORT BRANCH AND NORTHERN CENTRAL RAILROAD.

Via Catawissa & Williamsport Br.	190 07
" N. C. R. R. passing Locust Gap	1,521 09
" " " Shamokin	4,934 07
" " " Heradon	....
Total	6,646 03

SHIPPED WEST OR SOUTH FROM PINE GROVE.

Via Schuylkill & Susquehanna R. R.	1,899 11
" Lebanon & Pine Grove Branch	1,070 09
Total	2,970 01

CONSUMED ON LATERALS.

From Frackville Scales	807 07
" Mill Creek "	311 14
" Schuylkill Valley Scales	555 17
" Mt. Carbon "	625 00
" Cressona "	312 15
" Pine Grove "	121 08
" Tamaqua "	391 10
Total	3,122 11

LEHIGH AND WYOMING COAL.

Received via Silverbrook Junction, Sent East	8,768 05
" Cat. & Wpt. rr. " West	....
" " Rupert, Cat. & Wpt Br.	14 00
" " Allentown, E. Penn'a rr.	21 11
" " Alburtis, " "	....
" " Oreland, G. & N. Br.	1,008 05
" " Willow Street R. R.	315 00
Total	10,126 00

BITUMINOUS.

From Harrisburg	4,340 19
" Connecting R. R., G. & N. Br.	....
" Junction R. R.	20 00
Total	4,360 19

COAL FOR COMPANY'S USE.

Anthracite	7,084 03
Bituminous	231 01
Total	7,315 10

RECAPITULATION.

	Total for Week.	Corresp'g week last year.	Increase and Decrease.
Passing over Main Line and Leh. Val. Branch	104,479 10	89,275 04	i 15,204 06
For Shipment by Canal	18,848 18	22,965 19	d 4,117 07
Shipped Westward via Northern Central R. R.	6,646 03	3,896 11	i 2,749 12
Shipped West or South from Pine Grove	2,970 01	2,012 89	i 957 12
Consumed on Laterals	3,122 11	2,971 07	i 151 04
Lehigh and Wyoming Coal	10,126 01	783 07	i 9,342 14
Total Anthracite paying freig't	145,593 04	121,904 17	i 23,978 07
Bituminous	4,360 19	5,604 00	d 1,243 01
Total of all kinds paying freig't	149,944 03	127,204 17	i 22,735 06
Coal for Company's use	7,315 10	5,436 15	i 1,878 15
Total Tonnage for Week	157,259 13	132,645 12	i 24,614 01
Previously this year	3742485 14	3620715 12	i 121,713 02
Total to date	3899748 07	3753421 04	i 145,327 03

SHIPPED BY CANAL.

From Schuylkill Haven	19,112 00	22,590 00	d 3,478 00
" Port Clinton	2,371 00	1,307 00	i 1,064 00
Total Tonnage per Week	21,483 00	23,897 00	d 2,414 00
Previous. this year	363,827 00	440,965 05	d 76,538 05
Total to date	385,310 00	464,862 05	d 78,952 05

Delaware and Hudson Canal Company.

Coal mined and forwarded by the Delaware and Hudson Canal Company for the week ending Saturday, August 2, 1873.

	WEEK.	SEASON.
By Delaware and Hudson Canal	45,851	737,127
By Railroad, East	6,921	227,936
" West	13,809	289,636
" South	868	130,485
Total 1873	67,349	1,385,178
Corresponding time in 1872:		
By Delaware and Hudson Canal	54,429	732,196
By Railroad, East	4,214	339,236
" West	6,686	221,800
" South	8,054	215,320
Total	73,383	1,508,552
Decrease	126,374	

Delaware Lackawanna & Western Rail Road Company.

Coal transported on the Delaware, Lackawanna, & Western Railroad for the week ending Saturday, August 2, 1873

	WEEK. Tons. Cwt.	YEAR. Tons. Cwt.
Shipped North	26,769 04	488,578 18
Shipped South	28,075 00	1,284,251 10
	54,841 14	
Total		1,772,830 08
For the Corresponding time last Year:		
Shipped North	18,952 11	407,427 10
Shipped South	38,716 07	1,265,531 05
Total	57,668 18	1,672,959 15
Increase	.....	99,871 13
Decrease	2,827 14	

Report of Coal Transported over Lehigh Valley Railroad

Report of coal tonnage for the week ending August 2, 1873, with Totals to date, compared with same time last year.

WHERE SHIPPED FROM.	WEEK. Tons. Cwt.	TOTAL Tons. Cwt.
Total Wyoming	16,859 09	846,489 09
" Hazleton	41,606 11	1,352,156 08
" Upper Lehigh	....	2,099 09
" Beaver Meadow	10,340 01	424,486 16
" Mahanoy	13,509 05	398,776 03
" Mauch Chunk	23 00	2,442 04
Total	82,457 10	2,044,130 04
Same time last year	91,049 18	2,356,940 00
Increase	8,592 08	93,490 04
Decrease	.....	.....
Forwarded East from Mauch Chunk by rail	57,849 18	2,022,811 18
Same time last year	66,665 12	2,039,044 17
Increase	.....	23,767 01
Decrease	8,815 14	

DISTRIBUTED AS FOLLOWS.

Local East of Mauch Chunk	1,354 14	49,551 06
Forwarded East for use L. V. R.	1,090 04	33,436 02
Delivered to Furnaces and Manufacturing Companies	14,459 07	457,464 18
" " East Penn R. R.	126 01	3,041 01
" " North Pennsylvania Railroad	5 085 19	207,119 01
" " Port Del	4,317 15	107,316 16
" " East' Amboy Railroad	....	....
" " Morris and Essex Railroad	4,261 11	187,578 19
" " Bel. Del Railroad	22,719 19	641,297 14
" " Central Railroad	7,770 19	363,674 01
Delivered at and above Mauch Chunk for use of L. V. R. R.	1,182 04	48,719 10
To P. & N. Y. R. R.	12,483 04	287,971 15
To North'n Central R. R.	750 03	10,533 04
To D. H. & W. R. R.	5.5 13	22,351 19
To L. & S. R. R. at Packerton for rail	311 13	8,569 11
To Individuals at Mauch Chunk	10 04	1,139 09
To Individuals above Mauch Chunk	110 00	9 6 2 11
To L. & S. R. R., at Penn Hav., for railroad	....	1,541 10
Do. for canal	5 931 08	161,906 04
To Lehigh Canal Mauch Chunk	3,.43 10	29,321 16
To Catawissa Railroad	....	50 00
To L. & B. R.R. at Lack. June	....	49,910 17
Total	82,457 10	2,044,130,04

Report of Coal Transported over the Lehigh Canal

For the week ending August 1, 1873.

REGIONS SHIPPED FROM.	TIDE tons. cwt.	LOCAL tons. cwt.	TL WEEK tons cwt	TL. DATE tons, cwt.
Mauch Chunk Region	3,924 19	3,684 12	6,709 11	114,682 01
Mauch Chunk Region Hazardville	1,354 08	860 00	2,214 08	9,179 09
Beaver Meadow Region	674 03	4,994 17	5,668 00	61,494 07
Mahanoy Region	93 00	840 02	933 02	11,256 17
Hazleton Region	557 07	5,443 16	5,961 03	103,946 04
Upper Lehigh Region	95 01	773 12	868 12	14,643 07
Wyoming Region	1,852 18	1,460 01	3,312 19	49,912 18
Wyoming Region, Hazardville	....	....	....	736 08
Total	7,05 12	18,016 00	25 667 12	364,667 03
Previously reported	12,162 14	212836 17	237,999 11	....
Total to date	132914 06	230852 17	363,767 03	....
Corresponding week last year	150071 11	237920 05	387,991 16	....
Increase	....	....	....	....
Decrease	17,157 05	7,067 08	24,224 13	....

DISTRIBUTION.	WEEK 1873.	WEEK 1872.	YEAR. 1873.	YEAR. 1872.
Consumed on line of Lehigh Canal	3,969 07	2,868 02	36,039 07	33,183 08
Passed into Morris Canal to Tidal Points	196 17	406 17	1,447 16	2,916 08
Passed into Morris Canal to Local Points	992 09	911 11	13,859 00	11,363 09
Passed into Del. & Rar. Canal to Tidal Points	7,554 18	8,862 00	139,486 10	147,185 03
Passed into Del & Rar. Canal to Local Points	388 00	188 06	6,452 02	8,150 03
Consumed on line Delaware Div. Canal	2,024 18	5,088 03	20,310 12	24,583 11
Passed through to Bristol	10,542 01	11,581 09	154,062 16	155,670 14
	25,667 12	30,906 11	364,667 03	387,991 16

Report of Coal Transported over Central R.R. of N. J. (Lehigh and Susq. Div.)

Week ending August 2—Compared with same time last year

REGION SHIPPED FROM.	TIDE. tons ct.	LOCAL. tons ct.	CANAL. tons ct	TL WEEK tons cwt.	TL. DATE tons. cwt.
Wyoming	17208 04	4367 01	2451 14	24115 09	1021378 02
Upper Lehigh	....	980 06	351 06	1293 06	113 41 12
Beaver Meadow	3 02 04	1785 01	2725 09	7513 14	183819 09
Hazleton	....	8 1 14	8903 03	8913 16	11 4 0 12
Mauch Chunk	....	2760 06	4998 02	7648 08	309408 02
Total	2 885 08	9433 11	19281 08	49181 07	1,704844 17
Prev'ly reported	7637 7 00	576617 19	292236 02	1656541 10	....
Total to date	804175 17	586051 10	311517 10	1701664 17	....
Same time 1872	693330 08	490535 12	240,269 17	1420135 17	....
Increase	110845 09	105415 18	68247 13	284529 00	....
Decrease	....	....	....	....	....

DISTRIBUTION.	WEEK 1873.	WEEK 1872.	YEAR 1873	YEAR 1872.
Forwarded East by Rail to Tidal points	20388 08	25363 09	604175 17	693330 08
Forwarded East by Rail to Local points	7608 01	10507 18	251627 00	231804 08
Forwarded East by Rail use Central Division	692 14	1582 08	52225 02	45447 00
Forwarded East by Rail use L. & S.	63 15	166 02	7564 00	5018 13
Delivered at and above Mauch Chunk	480 04	1194 06	45110 04	31651 06
Delivered at Coalport & Hazard for Canal	16370 16	18232 19	248377 16	276189 08
Delivered to L. V. R. R. at Packerton	114 12	138 01	15143 10	9483 14
Delivered to L. V. R. Rd at Sugar Notch	2184 17	....	80965 02	....
Delivered to L. & B. R. R. at Plymouth Bridge	....	5648 09	120966 06	128923 03
Total	46108 07	68269 09	1704844 17	1439135 17

Penn. and P. V. R. R.—Coxton, Pa.

Coal tonnage for week ending August 2, 1873.

	Week. Tons.	Cwt.	Total. Tons.	Cwt.
Anthracite received:				
From Lehigh Valley R. R.	12 593	02	28,971	15
" Lack. & B. R. R.	829	17	18,574	08
" Pleasant Valley R. R.	1,343	12	104,411	14
" Sul. & Erie R. R.	597	14	22,446	02
Total	15,364	05	433,403	19
Same time last year	15,120	10	383,721	17
Increase	243	15	49,682	02
Decrease				
Distributed:				
To Lehigh Valley R. R.			23,568	01
To Lack. & B. R. R.	30	14	909	08
To S. Central R. R.	2,600	15	94,923	04
To Ithaca & A. R. R.	4,472	03	83 935	02
To Erie R. W. Pockets for shipm't.	6,524	11	183,617	14
To Erie R'lway, Wat'ins direct.	576	09	4,340	01
To individuals on line of road	230	09	18,376	17
To points at & above Coxton for use of Co.	187	11	17,572	01
To points between Waverley and Elmira	641	13	36,170	11
Total	15,364	05	433,403	19
Bituminous received from BARCLAY R. R.				
Shipped north from Towanda	6,825	06	191,8 3	18
Shipped south from Towanda	12	00	1,326	07
Northern Central R. R.			91	14
Total	6.837	06	193,231	19
Same time last year	6,976	08	228,113	09
Increase	139	02		
Decrease			34,881	10
Distributed:				
To Erie Railway	6,702	04	171,849	12
To So. Central R. R.	41	15	19,667	03
To Ithaca Valley R. R.	76	07	351	06
Lehigh Valley, R. R.	6	00	308	16
To individuals on line of Railroad.	12	00	746	18
To points on line of road for use of Company			118	04
Total	6,837	06	193,231	19
Grand totals transported				
Anthracite	15,364	05	433,403	19
Bituminous	6,837	06	193,231	19
Total	22,201	11	626,635	18
Same time last year	22,096	18	611,835	06
Increase	104	13	14,800	12
Decrease				

Statement of Coal Transported over Cumberland and Pennsylvania Railroad

During the week ending Saturday August 2, and during the year 1873, compared with the corresponding period of 1872.

WEEK.

	C. & O. C'l Tons.	Cwt.	B. & O. R. R. Tons.	Cwt.	Pa. S. Line Tons.	Cwt.	Total. Tons.	Cwt.
1873	8,801	18	27,924	01	1.347	16	38,073	18
1872	15,912	04	27,065	10	....		42,977	14
Increase			8 8	14	1,347	16		
Decrease	7,110	06	....		....		4,903	16

YEAR.

1873	317,0.3	08	826,863	20	47,836	02	1,231,722	10
1872	351,573	18	73',16:	12	....		1,084,737	10
Increase	5,449	10	91,670	08	47,836	02	147,985	00
Decrease	....		....		....		....	

Cumberland Branch R. R.

WEEK.

	To C. & O. Canal. Tons.	Cwt.	To B. & O. R. R. Co Tons.	Cwt.	Total. Tons.	Cwt.
1873	3,158	18	327	04	3,486	02
1872	5,818	06	316	01	6,134	07
Increase			11	03		
Decrease	2,659	08	....		2,678	05

YEAR.

1873	67,915	15	57,061	19	124,977	14
1872	117,477	18	10 840	19	1.8,318	17
Increase			46,221	00		
Decrease	49,562	03			3,341	03

Delaware and Hudson Canal Company.

Coal mined and forwarded by the Delaware and Hudson Canal Company for the week ending Saturday, August 2, 1873.

	WEEK.	SEASON
North	44,387 08	1,536,580 16
South	867 12	120,485 01
Total 1873	45,2:5 00	1 667,065 17
Corresponding time in 1872:		
North	50,285 07	1,508,'24 18
South	3,054 06	215,320 00
Total, 1872	58,339 13	1,723 554 18
Increase North	5,897 19	28,245 18
Decrease North		
Increase South		
Decrease South	7,186 14	84,834 19
Increase		
Decrease	13,981 13	56,589 01

Northern Central Railway, Shamokin Division.

Below is the return of Coal sent over the Shamokin Division of the N. C. R. W., for the 7 days ending August 1, 1873.

	Tons.	Cwt.
East	1 706	12
West	14,953	17
	16,670	09
Same time last year	13,701	12
Increase		
Decrease	2,968	17
Total amount shipped to date	348,699	04
Same time last year	314,026	14
Increase	34,672	10
Decrease		

Pennsylvania Coal Company.

Shipments of Pittston Coal for the week ending August 2, 1873.

	1873. WEEK.	YEAR.	1872. WEEK.	YEAR.
By Railway	28,6'0 19	697,7 7 04	21,28: 09	678,464 00
" Canal	253 04	4,4.6 06	248 17	2,998 06
	28,913 03	702,163 10	21,530 66	681,462 06
Increase, 1873	20,701 04			

Prices of Coal by the Cargo.

[CORRECTED WEEKLY.]

	AT NEW YORK R. A.	W. A	AT PHILADELPHIA. R. A.	W. A.
SCHUYLKILL.				
Lump	$- —	$5 45	- —	4 10
Steamer	- —	5 45	- —	4 10
Broken	5 70	5 45	4 35	4 10
Egg	5 85	6 00	4 50	4 25
Stove	6 05	5 75	4 70	4 40
Chestnut	5 20	5 95	3 85	3 60
Pea	- —	- —	- —	- —
LEHIGH.				
Freight to New York 50 cents.			- —	- —
Lump, (on board)	- —	- —	- —	- —
Broken	- —	- —	- —	- —
Egg	- —	- —	- —	- —
Stove	- —	- —	- —	- —
Chestnut	- —	- —	- —	- —
Pea	- —	- —		
SPECIAL COALS.*			- —	- —
Honey Brook, Le'h W. A.	4 85@5 55		- —	- —
Spring Mountain "	5 00@- —		- —	- —
Sugar Loaf "	4 90@5 70		- —	- —
Room Run "	4 70@5 55		- —	- —
Hill & Harris "	4 70@5 60		- —	- —
Shamokin "	4 70@5 60		- —	- —
Lykens Valley "	4 85@6 10		- —	- —
Broad Top "	6 60@- 10		5 35	- —

Company Coals.

August, 1873.

	L.	Str.	Grs.	Eg.	Sto.	Chest
*Scranton at E. Port	- —	—	—	—	—	—
†Pittston at Newburgh	5 00	5 00	5 10	5 2)	5 50	5 00
*Lackawana at Rondout	5 35	5 15	5 25	5 50	5 60	5 00
Wilk'b're at Pt. John'n	4 85	4 95	5 05	5 20	5 40	4 85
Old Co. Lehigh at Pt. John'n	5 80	—	5 65	5 85	5 70	5 00
New York Coal Exchange	5 65	—	5 50	5 50	5 65	4 95

For freights to different points see "Freights"
*To contractors only.

Prices at Baltimore—August, 1873.

Wholesale Prices to Trade.

Wilkesbarre, by cargo or car load	$4 80@5 40
Pittston and Plymouth, do	5 00@5 50
Shamokin Red or White Ash, do	5 35@5 65
*Lykens Valley Red Ash, do	@6 00
By retail, all kinds per ton of 2,240 lbs	6 00@7 00
*George's Creek and Cumberland f. o. b. at Locust Point for cargoes	4 85@5 00
West Va. and Youghigheny gas f. o. b. at L. Point	6 50
Kanawha Cannel, coarse	@12 00

* Freight to New York $2 15.

BITUMINOUS COALS.

Kittaning Coal Co.'s Phœnix Vein, f. o. b. at Phila	$
Lemon " " "	
Cumberland Vein Coal	
Tyrconnel f. o. b.	$7 00

Prices at Georgetown, D.C., and Alexandria, Va.

August, 1873.

George's Creek and Cumberland f. o. b. for shipping	$- —@4 75

Prices at Havre de Grace, Md.

August, 1873.

Wilkesbarre and other White Ash for Cargoes	$5 00@5 25
Lykens Valley	5 25@5 50
Shamokin Red or White Ash	5 75@6 00

Bituminous Coals (Cumberland).

Georgetown, F. o. b.	$4 60
Baltimore "	5 00
New York "	7 25
South Amboy "	7 50

Prices of Foreign Coals.

August, 1873.

Duty 75 c. per ton.

Corrected weekly by ALFRED PARMELE, No. 32 Pine street, N. Y.

Liverpool Gas Oaking	— —@— —
" " Cannel	17 00@— —
" House "	20 00@22 00
" Orrel	20 00@— —

Per ton 2,240 lbs., ex-ship.

PRICES FROM YARD.

Liverpool House Orrel, screened	$20 00@22 00
"Cannel, "	22 00@25 00

Per ton 2,000 lbs. delivered.

Prices of Gas Coals.

August, 1873.

PROVINCIAL.

Corrected weekly by Louis J. Belloni, Jr., 41-43 Pine st., N. Y

	Coarse	Slack
Block House, f. o. b. at Cow Bay	$2 50	$1 25
Gowrie	2 00	0 00

Corrected by Bird, Perkins & Job, 27 South street.

	Coarse.	Culm of Coal.
Pictou nett	$3 00	1 50
Sydney	3 25	1 00
Lingan	2 75	1 00
Caledonia	2 75	1 25

A discount from the prices of the coarse Coal on purchase of 5000 tons and upwards. Duty on all slack coal or Culm: 40c. per ton of 28 bushels, 80 pounds to the bushel. On all bituminous coal or shale: 75 cents per ton of 28 bushels.

AMERICAN.	Nominal quo Currency.
Westmoreland f. o. b.	$6 00 @7 00
Fairmount Gas Coal Co. of N. Y. "	6 50 @7 0
Despard Coal Co. "	6 50 @7 00
Penn. "	6 50 @7 00
Newburg Orrel Gas. "	6 50 @7 00
West Fairmount Gas Coal "	6 50 @7 00
Redbank Cannel, at Pa "	12 00 @0 00

AT PHILADELPHIA.

Westmoreland "	7 50 @0 00

Rates of Transportation to Tide Water.

BY RAILROAD.

TO PORT RICHMOND, PHILADELPHIA.

Philadelphia and Reading Railroad, from Schuylkill Haven Lump and St., net, $1 60; Br., Egg and Ch., $1 65; Stove, $1 75 Shipping at Pt. R., 20c., for use at Phil., $2 18 from Pt. Carbon,

MAUCH CHUNK TO ELIZABETHPORT.

L. V. Railroad from Mauch Chunk to Phillipsburgh	$0 72
C. R. R., N. J., Phillipsburgh to Elizabethport	06
Shipping expenses at Elizabethport	25
Wharfage	10
Total	$2 23

MAUCH CHUNK TO PORT JOHNSTON.

L. V. R. R., or L. & S. R. R. from M. C. to Phillipsb'g	$0 72
C. R. R., of N. J., Phillipsburgh to Pt. Johnson	1 06
Shipping expenses	25
Wharfage	10
Total	$2 23

TO HOBOKEN

L. V. R. R., Mauch Chunk to Phillipsburgh	72
Morris & Essex R. R. Phillipsburgh to Hoboken	1 06
Shipping expenses	25
Wharfage	00
Total	$2 23

TO SOUTH AMBOY.

L. V. R. R.	
B. & D. R. R.	
Cam. & Am R. R.	
Shipping Expenses	35
Total	$2 23

PENN HAVEN TO ELIZABETHPORT.

L. V. R R. Penn Haven to Phillipsburgh	84
C. RR. of N. J. Phillipsburgh to Elizabethport	1 06
Shipping expenses	15
Wharfage	20
Total	$2 35

Freights.—August, 1873

TO EASTERN PORTS	Cumberland. From Georgetown.	From Baltimore	Anthracite. From Philadel'a.	From Shp. Port, Port Johnson, Weehawken, and Hoboken.	From Newburgh.	From Rondout.
Amesbury	3 75	—		—	—	—
Bangor	3 25	—		—	—	—
Bath	3 00	3 00		—	—	—
Boston	2 90	3 00		1 85	1 85	1 95
Bridgeport	2 40	2 5.		1 00	1 20	1 25
Bristol				1 40	1 60	1 60
CohassetNar'ows	3 10	—		—	—	—
Derby	3 00	—		1 .5‡	—	—
Dighton	2 6.	—		—	—	—
East Cambridge	2 75	—		1 25	1 90	2 00
Fall River	2 50	2 60		1 40	1 40	1 60
Hackensack	—	—		—	—	—
Hartford	3 00	3 25		1 50	—	1 75
Hoboken	2 0.	—		50	—	65
Jersey City	2 05	—		40	—	2)
Lynn	—	—		—	—	—
Middletown	—	—		1 25	—	1 50
Mystic	—	—		1 25	—	1 45
New Bedford	2 60	2 85		1 45	—	1 60
Newburyport	3 25	3 25		2 00	—	2 05
New Haven	2 50	2 80		1 00	1 20	1 25
New London	2 80	2 80		1 20	1 30	1 40
Newport	2 60	—		1 40	1 50	1 55
New York	2 25	2 15		50	—	65
Norwalk	2 5.	2 60		1 00	1 20	1 25
Norwich	2 60	2 80		1 30	—	1 60
Pawtucket	1 50	2 80		1 50‡	—*	—
Portland	2 95	3 00		1 75	—	1 70
Portsmouth, N. H	3 15	3 25		2 00	—	—
Providence	2 40	2 60		1 40	1 55	1 60
Rockport	—	—		—	—	—
Saco	—	—		—	—	—
Sag Harbor	—	—		1 20	—	—
Salem	3 20	3 00		1 80	—	1 95
Stamford	—	—		1 00	1 20	1 25
Stonington	—	—		1 20	—	1 45
Taunton	—	—		1 20	—	—
Warren	—	—		1 90	—	—
				1 40	—	—
TO RIVER PORTS						
Albany	2 50					55
Catskill	—					50
Cocksackie	—					50
Cosyman's	—					65
Cold Spring	—					20
Fishkill	—					20
Haverstraw	—					40
Hudson	2 40					40
New York vessels	2 00					65
Nyack	—					45
Poughkeepsie	2 40					30
Rhinebeck	—					30
Rondout	—					—
Saugerties	—					40
Sing Sing	—					50
Stuyvesant	—					55
Tarrytown	—					50
Troy	—					60
West Point	—					20
Yonkers	—					50

† 3 c. per bridge per ton in addition to freight.
† New Haven rate and towing 25 c. extra per ton.
‡ Towing from Providence and return, extra.
§ And towing.

St. Thomas	$- — Gold
Martinique	— — "
Demerara	— — "
New Orleans	— — "
Mobile	— — "

Foreign and Provincial Freight

August, 1873.

Foreign.

Newcastle and Ports on Tyne, per keel of 21 1-5 tons £ Liverpool, 5 per cent primage

TO NEW YORK.

Provincial	
Sydney	
Lingan	
Cow Bay	$3 5
Port Caledonia	4 00
Little Glace Bay	4 00
	4 00

TO BOSTON.

Sydney	3 50
Lingan	3 60
Cow Bay	3 50
Port Caledonia	3 50
Little Glace Bay	3 50

TO MONTREAL.

Caledonia	3 75 gold

TO CUBA.

Caledonia	2 50 gold.

MARKET REVIEW.

NEW YORK, Aug 6th, 1873.

IRON—With the exception of a small jobbing business in Scotch Pig there is scarce'y anything doing; we quote Eglinton $45, Glengarnock $40, and Coltness $51@52; 100 tons Glengarnock sold on private terms. American Pig is also quiet, and prices are irregular and somewhat in buyers' favor; we note sales of 300 tons No. 2 X Carbon, 100 do. 2 X Hudson, and 100 do. 2 X Poughkeepsie, all on private terms. Old and new rails are entirely nominal, there having been no business recently. Scrap is dull; 100 tons sold on private terms.

LEAD—Foreign Pig has been very quiet since our last; price of Ordinary 6¼@6¾ cents gold; 150 tons Domestic sold on private terms, generally held at 6¼ cents gold. Bar 9¼ cents, Sheet and Pipe 10¼, less 10 per cent. to the Trade.

Withdrawals from bond for consumption 1st, 2nd, and 4th August—

Lead, Germany..... pigs. 2,950

COPPER—New Sheathing is steady at 38 cents, and Bolts and Braziers 40; Bronze and Yellow Metal Sheathing 27, and Y. M. Bolts 32, net cash. Ingot has become very quiet again, the recent free purchases having supplied the wants of buyers; parcels of Lake for present delivery may be quoted 27@27¼ cents, and for future delivery 28. English is nominal.

STEEL—There is no change in the situation, the supply of English Cast being scarcely equal to the demand. American is steady at our quotations.

TIN—The demand for Pig is still very limited and prices soften a little; we only hear of the sale of five tons English to arrive, August shipment, at 28¾ cents. Straits may be quoted 31½ cents, English on the spot 29¼, and to arrive in September 28½@28¾, Banca entirely nominal at 35, all gold. Plates are also unusually quiet; and receipts are considerable, but prices are without quotable change; we have only to notice the sale of 100 bxs. Charcoal Terne at $10.31¼ gold.

Withdrawals from bond for consumption 1st, 2nd and 4th August—

Tin from England..... bxs. 935

The following is from Messrs. WHITE & HASKELL'S Circular of 1st inst.

The improved tone of the market noted in our last continued with the opening of July, sales having been made of about 2,500 slabs from store, and 5000 slabs to arrive, the former at 31@31½ cents, and 31 for the latter. English common has been freely offered, with sales from 29¾ to 30 cents, July, August, and September shipments. Refined 30½@30 cents, with sales at 30¾@30; Banca 36@34½, and small sales. With English Common and Refined freely offered at 29 and 30 cents for shipment in August and September, and reports of a declining market in Europe, the market has been dull, but prices well maintained, Straits and Billiton selling at 31½@31¾ cents from store and to arrive, 31 asked; English Common, 30 from store, 29 for shipment; and Refined 30. At the close, market is steady at these figures.

The importations of Pig for July were;—

	Slabs.	Tons.
Straits, &c.	1,048	42
English L. & F		40

From the East Indies 13,679 slabs or 550 tons Straits, &c. are on the way and due in all August, September and October.

Stocks on importers' and speculators' hands:—

	Slabs.	Tons.
Straits, &c.	10,100	405
English L. & F.		20
Total, New York and Boston	10,100	425
Against July 31, 1872	5,100	228
" July 31, 1871	1,358	75
" July 31, 1870	2,180	80

PENANG, June 16,—(Fraser & Co.)—After the closing of last mail a purchase of Tin was made at the rate of $33.60@$33.65 for 800 piculs Junk Ceylon, but was immediately followed by further contracts at $33.80@$34 per picul. Subsequently during the past week the price has been weaker, and last rates paid have been $33.60 for Junk Ceylon, which we give as closing value. About 2,500 piculs have been taken for Europe and America during the fortnight, part of which will go on Via Singapore, as we have been so long without steamers calling here.

ZINC—Mosselman Sheet is unchanged—market quiet. American oxide 8@9 cents, Manganese 4@4½ cents.

Mr. EDWARD SAMUEL, under date of Philadelphia, Aug. 1st, 1873, reviews the market for the month of July as follows:

AMERICAN PIG IRON.—The past month has been even more monotonous than June, and, in consequence of the small demand, prices have been receding for all numbers. Many of the mills have, as usual at this season, stopped for repairs, and this, together with the extremely low price ruling for Merchant Bar, has put a stop to inquiry for forward delivery for Forge numbers. In the absence of transactions, and in consequence of the varied prices paid, quotations must be considered nominal—would say, for No. 1, $44@45; No. 2, $37@38; No. 3, $32@33 at Furnace.

SCOTCH PIG.—The local market is inactive, with sales only of jobbing lots. In New York there has been considerable activity, and most all of the steamer lots which were sold at a heavy loss have been bought up by one or two large dealers—consequently, prices have advanced there from $42 for Eglinton in the early part of the month to $45 at the close. The last English prices, under date, Liverpool, July 15th, are as follows:

Gartsherrie, 121s.; Coltness, 125s.; Summerlee, 121s.; Langloan, 122s., 6d.; Calder, 122s., 6d.; Carnbroe, 117s., 6d.; Glengarnock, 118s.; Dalmellington, 114s., 6d.; Eglinton, 114s., 6d.; F. O. B. Liverpool about 7s. per ton more, all round.

Exports to the U. S. for month of June	8,988
" " for 6 months, ending June 30,	63,183
Stock of Pig Iron in store, Glasgow, December 25, 1872	106,919
Stock of Pig Iron in store, Glasgow, July 11, 1873,	47,749
Decrease	59,170

RAILS have been but in light demand for heavy sections, but for light sections there has been a fair inquiry for narrow gauge roads. Prices rule at different mills from $76 to $80 for sections, 50 lbs. and upwards.

MERCHANT BARS are the dullest article on the list; indeed it is impossible to force sales at any concessions. The store price here is 3.8 cts. per lb. Some few sales of Pittsburgh Bars are reported at 3¼ cts. there, but 3½ cts. is the general quotation.

OLD RAILS are without movement at nominal quotations of $52 for D Hs and $48@49 for Ts.

WROUGHT SCRAP has been sold as low as $40, ex-ship, and the demand even at this low figure is light.

In the quiet condition of the market generally, and in the absence of transactions, it is extremely difficult to give a fair idea of prices. The tone of the market is however weak, and it is impossible to make any predictions as to the near future. The Pig makers complain that at present prices, there is a loss in producing Forge numbers. In Bars, the present prices also show a loss to the makers, so that it is more than likely that, if even a moderate demand arises, a reaction in prices will occur.

The following is Messrs. BIGELOW & JOHNSTONS circular for July.

NEW RAILS.

IRON—Foreign, $64@65 gold; *American, $74@78 currency; Import at New York this month, 2,632 tons; previously since January 1, 38,817 tons; total to date, 41,449 tons; †same time, 1872, 100,319 tons; same time, 1871, 96,971 tons.

STEEL—Foreign, $108@112 gold; American, $120@125 currency; Import at New York this month, 5,826 tons; previously since January 1, 42,517 tons; total to date, 48,343 tons.

OLD RAILS.

Double Heads, $48@50 currency; T or Flange, $46@47 currency; U or Bridge, nominal; Import at New York this month, 547 tons; previously since January 1, 8,554 tons; total to date, 9,101 tons; same time, 1872, 31,747 tons; same time, 1871, 19,887 tons.

SCRAP IRON.

No. 1 Wrought, $42@44 currency.

PIG IRON.

American Forge, $30@33 currency; No. 1 Foundry, $44@45 currency; No. 2 Foundry, $40@42 currency; Scotch No. 1 Foundry, $45@52 currency; Import of Foreign this month, 3,906 tons; previously since January 1, 35,242 tons; total to date, 39,148 tons; same time, 1872. 61,074 tons; same time, 1871, 43,178 tons.

SCRAP IRON—Very dull and lower.

PIG IRON—There has been a little doing in American at low figures, and considerable in Scotch. Owing to the small stock on hand, and the steamship lines not bringing out any more, holders are asking full prices.

NEW RAILS—There has been little or no change since our last in either Foreign or American. Prices remain about the same, with a disposition on the part of holders to meet the views of cash purchasers.

OLD RAILS—There have been a few transactions, Double Heads selling here and in Philadelphia at our quotations. The arrivals are few and have generally gone into consumption.

*These prices represent as nearly as possible the range, according to location of Mill.

†These figures included Steel.

San Francisco Stock Market.

BY TELEGRAPH.

NEW YORK. Aug. 6, 1873.

We have advices from the San Francisco Stock Board, dated the 5th inst. The market is irregular, with the tendency downward; the rise in Raymond & Ely forms the most prominent feature in the report, having advanced to $64.50 since our last. The following dividends, with their dates of payment, are announced: Eureka Consolidated $1 per share, July 21st; Eureka G. V. $1, August 7th; Belcher $7, August 9th. The decline of the thirteen leading mines from the 1st to 23d of July, "according to a recent contemporary," aggregated over $6,200,000, the decline in Savage amounting to $1,288,000 or $118·50 per share. Virginia Consolidated $36 per share, or $868,000; Chollar, $21.50 per share, or $580,000; Crown Point, $8 per share, or $800,000; and Belcher, $10 per share, or $1,040,000. The declines in Crown Point and Belcher were in the face of dividends paid, although few shares changed hands. Savage is charged as being the cause of the whole list falling. It is rumored that there are no prospects of a settlement between the Raymond & Ely and Hermes Mining Companies, and that they are preparing for renewed litigation. The heavy fall in stocks has, of course, had the effect of reducing the amount of business done in the market. The fact that mining companies listed in the Board had paid up to June 30th the sum of $7,414,181 in dividends as against $4,026,000 during the same time last year, had no effect in keeping up even the prices of these stocks. Even the best-paying mines feel the effects of the decline of a fancy stock like the Savage. The report is as follows:

	Aug. 6.
Savage	43
Crown Point	83
Yellow Jacket	42
Kentuck, "New Issue"	7
Chollar Potosi	40
Gould & Curry "New Issue"	9⅜
Belcher "New Issue"	76
Imperial	4⅜
Raymond & Ely	64½
Meadow Valley	20⅜
Eureka G. V.	20
Ophir	—
Hale and Norcross	—

American Institute of Mining Engineers.

OFFICIAL BULLETIN.

Announcements to Members and Associates.

I. The ENGINEERING AND MINING JOURNAL, which is the Organ of the Institute, and contains its proceedings, transactions and notices of meetings, will be sent to each Member and Associate on the payment of his annual dues. Back numbers cannot, as a rule, be sent.

II. Dues are payable in advance at the annual (May) meeting. Remittances should be made, as far as possible, by P. O. Order, payable to the Secretary.

III. The first volume of Transactions of the Institute is in course of preparation and will be sent, as soon as issued, to all members not in arrears.

IV. General meetings are held on the fourth Tuesday of February, May and October. Authors of papers are requested to notify the Secretary, in advance of meetings, of the subject and length of their papers.

THOMAS M. DROWN, Secretary.
1123 Girard street, Philadelphia, Pa.

MISCELLANEOUS.

The Largest Organ Establishment in the World.

SEVEN EXTENSIVE FACTORIES.

J. ESTEY & COMPANY,

BRATTLEBORO, VT., U. S. A.

THE CELEBRATED

ESTEY COTTAGE ORGANS.

The Latest and Best Improvements.

Everything that is new and novel. The leading improvements in Organs were introduced first in this establishment.

ESTABLISHED 1846.

SEND FOR ILLUSTRATED CATALOGUE.

April 1 6m

THE ENGINEERING AND MINING JOURNAL.

ROSSITER W. RAYMOND, Ph. D.
JOHN A. CHURCH, E. M. Editors.

PUBLISHERS' ANNOUNCEMENT.

THE ENGINEERING AND MINING JOURNAL *is projected in the intent of furthering the best interests of the Engineering and Mining public, by giving wide circulation to original special contributions from the pens of the ablest men in the professions. The careful illustration of new machinery and engineering structures, together with a summary of mining news and market reports, will form a prominent feature of the publication.* It is the Organ of the American Institute of Mining Engineers, and is regularly received and read *by all the members and associates* of that large and powerful society, *the only one of the kind in this country.* It is therefore the best medium for advertising all kinds of machinery, tools and materials used by Engineers or their employees.

SUBSCRIPTION—$4 *per annum in advance;* $2 50 *for six Months,*

ADVERTISEMENTS—*The rates are as follows: Inside pages, 35 cents per line each insertion; the outside or last page, 40 cents per line. Payment required in advance.*

NEWSDEALERS *will be supplied through the agency of the* AMERICAN NEWS COMPANY, *No.* 121 *Nassau street, New York City.*

COMMUNICATIONS *of all kinds should be addressed to the Secretary. The safest method of transmitting money is by checks or Post-office orders, made payable to the order of* WILLIAM VENTZ, *Correspondence and general communications of a character suited to the objects of* THE ENGINEERING AND MINING JOURNAL *will always be welcome.*

The Postage on THE ENGINEERING AND MINING JOURNAL *is twenty cents a year, payable quarterly in advance, at the office where received.*

THE SCIENTIFIC PUBLISHING COMPANY.
WILLIAM VENTZ, SECRETARY.
27 Park Place,
P. O. Box 4404. NEW YORK CITY.

CONTENTS FOR THIS WEEK.

On a Relation Subsisting between the Atomic Weights, Specific Gravities, and Hardness of the Metallic Elements..... 97
Boiler Inspection in Hartford 97
On the Decomposition of Metallic Carbonates by Heat..... 97
Mineralogical Notes on Utah, California and Nevada, with a Description of Fricolite, a New Boracic of Lime..... 98
Experiments with Pneumatic Tubes..... 99
The Blast Furnace as Applied to the Cupola of the Iron Founder..... 99
THE COAL TRADE..... 101
MARKET REVIEW..... 102
San Francisco Stock Market..... 102
The American Institute of Mining Engineers..... 102
Advertisements..... 102
EDITORIALS:
The Mistakes of Trade Societies..... 104
The Coal Combination..... 104
CORRESPONDENCE.—The Bismuth Ores.... 105
The Hunt and Douglas Copper Process.... 106
The Prospects of British Iron Works..... 106
On the Copper Deposits of the Blue Ridge..... 106
The Axe Manufacture in Cohoes, N. Y.... 107
MINING SUMMARY:
Lake Superior..... 107
California..... 108
Nevada..... 108
Colorado..... 108
Advertisements..... 109

THE *Colliery Guardian* some time since made some calculations based on a Parliamentary return upon the number of accidents in British collieries, which showed that for the ten years from 1851 to 1860 there was one life lost to every 245 men at work, and from 1861 to 1870 (inclusive) one life to every 301, a gain of 22·45 per cent. But the improvement in coal getting has been much greater than the numerical increase of the force, and comparing the losses with the amount of coal extracted we find that from one life to 59,000 tons in 1851 the rate has decreased until in 1870 it was one to 114,000 tons. Classifying the accidents it is proved that in those from falling of the roof and other material there is an increase in the second over the first mentioned decade, and also in the "miscellaneous" causes, while accidents in the shaft are less numerous. That is to say the causes over which the miners have most control have produced more accidents, and those in the power of the managers have produced fewer; while explosions have been about equal in destructiveness in the two periods.

The Mistakes of Trade Societies.

It is reported that trouble has come upon the National Association of Iron Manufacturers, and that in consequence of dissensions between Eastern and Western members that body will cease, or has ceased, to exist. The secretary, Mr. DUNLAP, has retired from office, and the organization now has no independent headquarters. The extreme secrecy which has characterized the meetings of the association inclines us to believe any stories that may be afloat concerning it. Men engaged in forwarding the interests of so public a calling as iron making are not likely to hide their light under a bushel unless there is trouble in the camp. The association in question has made some great mistakes. It evidently regarded itself as a close corporation, working for its own narrow interests, and failed to see that a society which professedly included every iron making establishment in the United States must take measures for the united advancement of the whole body. Protection instead of metallurgical progress was its chief care, though we venture to say that no amount of duty on foreign iron can neutralize the cost of bad management and wasteful processes. The progress that has been made in iron works since the days of TREDGOLD is far more than sufficient to offset the duty imposed by Congress, and a careful survey of American iron works would probably convince the investigator that we have it in our power to cheapen still further the production and utilization of iron. In this direction there lies a prospect of gain which no political influences or "British gold," or the vassalage of foreign workmen can neutralize.

The immense yearly production of England is obtained from all kinds of furnace apparatus ranging from old "rattletraps" of furnaces which do the worst and costliest work, to the most modern and economical constructions. It is true that the intelligence of English iron masters has led them to replace very many of the old works without regard to money thrown away, and had they not taken this course they would now be in a position far worse than that they really occupy. But even in this point Americans have the advantage of them. A very large part of our present production is from works built since the war, and which ought to embody the best arrangements for iron making. By the time we reach a production as great as that of our rival the furnace plant of the country will be entirely new, and if it is properly built the average amount of labor and fuel spent in making a ton of metal ought to be less in this country than in any other. Our iron masters as a body can do better by raising the standard of metallurgical knowledge in the country than by disseminating any amount of protectionist doctrine. In fact we fail to see that any advantage results from the protection tracts, papers and articles which are issued in such numbers. So far as we have observed they fall dead from the press. If we are not very much mistaken the American nation, whether considered in the individual opinion of its people, or in its Congress, or in its press, is too strongly inclined to protection to be suddenly thrown upon a free trade policy in some moment while the protectionists are sleeping. Such a marked change of policy could take place only after long discussion and ample opportunity for a fair battle. When the danger comes let us meet it actively, but until it does come there are more important issues to take our attention.

In saying these words, we desire to be distinctly understood as neither favoring nor opposing Protection. It is not a national principle which we are discussing, but the management of certain professional societies. We think they have given too much attention to trade considerations and too little to professional improvement. Trade considerations are important, and demand their share of time and trouble, but they should not be allowed to exclude the other; and yet, we think, no one can recall the work of our societies during the past ten years without coming to the conclusion that they have by no means borne their share in the great work of improving the metallurgy of the day. In American practice there are many interesting points which distinguish it from the practice of any other nation, but the proceedings of American societies contain no record of them. Few iron-makers take pains to ascertain the working economy of the apparatus they use, excusing themselves on the ground of the cost of such investigations. It is difficult, and perhaps impossible, to produce specific proof that expenditures of this kind pay; but we are inclined to think that if British ironmasters had avoided expenses of this kind their position now would be much worse than it really is.

We repeat that the purpose of these remarks is to criticise the course which American societies have pursued hitherto, and not to criticise the principles in the defense of which their action has been taken. We do not know that those principles now stand in pressing need of defense; and yet we have seen an influential and rich body of American iron-makers decline to send a commissioner to study the iron business of Europe at a time which is especially favorable for the task, and decline on the ground of expense, though it can find ample supplies for stupid Protection publications, which are worthless to all concerned. If the Pig Iron Association has really ceased its existence, we trust that the machinery for the collection of statistics—a department in which it rendered real service—may be handed over to some other organization which will continue to employ it.

The Coal Combination.

The combination, which by its so far successful operations has made the year 1872 memorable in the annals of the coal trade, has had the honor of a fresh attack from the daily press. Combinations for the purpose of putting up prices are justly considered odious by the people and the daily papers, which, as political organs, feel bound to sound the people's trumpet, and make it a point to attack every monopoly, and everything that looks like monopoly, without regard to truth or right. There are things worse than monopolies, and one of them is a trade so disordered that no dependence can be placed upon it and no investments safely made in it. The coal trade is one that more than almost any other should be steady and regular in its movement, for its prices affect the cost of almost every manufactured article that is produced away from the immediate neighborhood of the great forests. We have never looked to the higher cost of coal in 1873 as a cause of the prevailing depression in business. Throughout the whole season prices have been regularly advancing according to a scale announced in the beginning, and these, so far as they go, are the conditions for a safe expectation of profit in all industries in which coal forms a large part of the running expenses. We have before this not hesitated to defend, to a certain extent, the action of the great companies in uniting for the advance of prices, and we will now state some of the points in the case again.

The companies which from their united action have received the name of the Combination, commenced their course in the fall of 1872 and based it upon alleged losses during that year. The newspapers now flatly accuse them of lying, and in proof point to the fact that these companies paid dividends last year and must therefore have had profits. We know of no reason for doubting the word of the companies. They say they lost money, and the average price of coal was so low that it seems doubtful if they could have made a profit. The following table shows the prices of business of one company for seven years past:

YEAR.	TONS.	AMOUNT.	AVERAGE.
1866.....	247,831	1,602,248 61	$6,465
1867.....	530,011	2,555,644 11	4,821

YEAR.	TONS.	AMOUNT.	AVERAGE.
1868.....	607,992	2,727,638 76	4,486
1869.....	588,688	3,349,266 41	5,689
1870.....	727,373	3,376,375 95	4,641
1871.....	524,420	2,678,263 73	5,107
1872.....	812,088	3,007,938 42	3,703
Average for 7 years			$4,778

The fact that the price in 1872 was $1 below the average, and the known distress in the trade at the close of last year's season are proofs that the companies did not misstate their affairs when they declared that coal mining was a losing business at those rates. They determined to restrict the production sufficiently to restore the prices to the average of the above seven years. This they have done, and if the programme of the year is carried out as they planned it, the average will probably be between $4 78 and $5 00.

It is ridiculous to say that the companies have no right to restrict production. That is an every-day operation in all kinds of business to relieve an overstocked market. When we turn to soft coal we find that this method has been the very basis of that trade for years. The companies have always had a minimum price beyond which they will not go, and if the consumers do not like it, they shut up their mines until the market is ready to pay their rates. They are not criticised for this course, and we do not know that they deserve criticism.

One of the chief charges against the combination is that the price of coal has been arbitrarily advanced in the face of a dull demand. Even in this they show that they know their own business better than other people do. Coal is a thing that will not bear storage. Prices are made on the basis of immediate delivery and if this immediate delivery does not take place and the company has to pay storage the entire profit is wiped out. Quick sales and small profits is the maxim of the trade, and by obeying it America enjoys to-day the distinctive honor and profit of supplying the cheapest coal known in the world. But this system cannot be maintained properly unless some penalty is attached to dilatoriness. That penalty has been arranged in the form of a monthly increase. No dealer is compelled to take coal in May if he chooses to wait until August; the mining company merely says that in August he must pay more for it. Were it not for this provision, it is plain, the whole extraction of coal would be forced into the closing months of the season, or the company would have to carry heavy stocks and add a large interest and storage account to their cost price. Advancing monthly rates are no new thing, but form the history of every year which does not present anomalous fluctuations in its prices.

We fear the attack upon the combination is more likely to do harm than good. The bidding at the last auction sale was of an unrestrained kind, which we do not believe was pleasant to the combination, though the advance was double what they had made it. The onslaught of the daily papers has already had some effect upon the demand, for it has widely advertised the fact that prices are going to be higher. Nor is the attack fairly made. It misrepresents the position of the companies; it conceals the fact that one of the most prominent of the great companies—the Pennsylvania—is not in the combination, has acted independently of it, and may at any time serve as a check upon undue demands. The attack also conceals the fact that coal is one of the very few articles—the only great staple—which has fully returned to ante-war prices. Anthracite cost about as much twenty years ago as it does now. But flour has doubled in price, and it has been neatly pointed out that the *Tribune* has followed the same tack, and now asks four cents for what it once sold for two. Let any one compare the price of coal with the other staples, and he will find that either wheat must be removed from its position as the standard of value and coal substituted in its place, or he must come to the conclusion that the latter has fallen very much in purchasing power below its position fifteen years ago.

We know very well that there is danger in a combination of this sort, but we do not see that it is a danger which is likely to become pressing this year; and when it does come, we shall be just as able to confront it as we are now. After many years of an uncertain market and fluctuating prices, it is a relief to turn to a new system. It remains to be seen whether the evils of the new are to be greater than the disorder of the old method. If the leaders of the movement exhibit sound discretion, they can reform the business without awaking the resentment of the people—a resentment which could have no result but disorders of the same kind which they are seeking to avoid.

The Hunt and Douglas Copper Process.

The readers of the ENGINEERING AND MINING JOURNAL are already acquainted with this new moist process for the extraction of copper from its ores, which depends upon the power of ferrous chlorid to chloridize, and, in the presence of a strong brine, to disolve the oxyds of copper, while the precipitation of the metallic copper from this solution by means of metallic iron perpetually regenerates the ferrous chlorid. The following letter explains itself: It need only be remarked that by the simple expedient of keeping apart the liquors used in washing the residues, and precipitating them separately, Mr. CLAYTON has overcome the difficulties which would otherwise arise from the dilution of the bath and the necessity of concentrating it.

ORE KNOB COPPER MINE,
ASHE COUNTY, N. C., June 22, 1873.

Messrs. T. STERRY HUNT and JAS. DOUGLAS, JR.:

GENTLEMEN—Your favor is received, and in reply I will give you the information requested, so far as in my power, regarding the working of your process for the extraction of copper in the wet way, at our mines in Davidson County, in this State, where we first erected a small plant as an experimental work, to prove your process, early in 1872.

The ore to be treated was a copper-pyrites of low grade, dressed to contain from 100 to 120 pounds of copper to the ton of 2000 pounds; the gangue was a clay-slate. Our mode of treatment was as follows: the ores were crushed, sized by being passed through a sieve of forty holes to the linear inch, and sent to the calcining furnaces. These furnaces were simple three-hearth reverberatories, and were charged every eight hours with 2000 pounds of the prepared ore; the charges, after being in the furnaces for twenty-four hours, were withdrawn, weighed, assayed and sent to the tanks. The calcination was effected at a low red heat, with a view of converting about one-third of the copper in the charge into sulphate; the remainder being as oxyds, with the exception of from five to seven and a half pounds to the ton remaining as unoxydized sulphuret.

The calcined ore was next charged into tanks of about 3,000 gallons capacity, two-thirds filled with bath, in weighed portions of 3,000 pounds. The mixture was then agitated by a stirring apparatus connected with the tank, and steam injected in sufficient quantity to raise the temperature to about 120° Fahrenheit. After eight hours' stirring, the mixture was allowed to subside, the copper-solution drawn off into settling-tanks, and about 600 gallons of weak bath drawn down upon the residues remaining in each stirring-tank, to cleanse them of the copper-liquor. This weak bath was then drawn off into tanks containing metallic iron, the copper precipitated therefrom, and the liquid passed into a reservoir-tank, to be again used in washing the residue from the following charge. The stirring-tanks were then emptied and the residues wheeled away. The general average of loss in these residues was from six to ten pounds of copper to the ton of ore treated.

The strong copper-solution, after fully subsiding in the settling-tanks, was drawn into tanks containing iron (cast or wrought iron scrap), the copper precipitated, and the bath, with a small addition of salt, used in the treatment of a new charge of roasted ore.

I have thus given you the mechanical working of the process, and will now add the cost and the results, as obtained in more than a year's working. After an experimental trial of a few months, we erected works equal to the treatment of the whole ore-product of the mine. We in the first start prepared a given amount of bath, according to your formula, with copperas and salt, and found in working the process that by calcining the ores at a low heat, avoiding a dead roast, and bringing from 25·0 to 33·0 per cent. of copper into sulphate, the bath was easily kept at standard strength without the addition of any copperas whatever. The salt added was equal to twenty-five per cent, and the maximum of iron consumed to seventy per cent. of the copper produced.

Our cost of making copper, obtained as cement, exclusive of mining and dressing the ores, and not including the power required to work the stirring tanks (which was merely nominal) was as follows: estimating the ores at the general average of 5½ per cent. and the quantity treated daily at 21 tons of 2,000 lb., yielding, with an allowance of ½ per cent. for loss, 2,100 lb. of copper. The roasting in three-hearth reverberatory furnaces requires one-third of a cord of wood to the ton of ore.

7 cords of wood at $1 00 per cord	$ 7 00
21 men at 7 furnaces, at $1 00	21 00
4 men charging furnaces and tanks at 75 cents.	3 00
4 men emptying tanks and removing residues at 75 cents.	3 00
2 men attending tanks at $1 00	2 00
Foreman	2 00
Chemist	3 00
525 pounds of salt, at 1¼ cents.	6 56
1,470 pounds of iron at 2 cents.	29 40
	$76 96

The above estimate, which makes the cost of producing 2,100 pounds of copper from 21 tons of 5½ per cent. ores, $76 96, equal to 3⅔ cents a pound, is based upon the prices of labor and fuel in Davidson County.

The cost of the plant required for your process is small. The furnaces are simple and inexpensive in construction, and require about 25,000 bricks each. The tanks cost, complete, about $60 each, and the labor employed need not be skilled nor high-priced, as the ordinary laborers of the country can in a short time be trained to the routine of the work.

From my experience of your process I am most favorably impressed, and we have now in contemplation the erection, this season, of a plant upon a very large scale to work by it the high-grade ores of this mine, containing, as broken, from 400 to 600 pounds of copper to the ton. For economy of fuel and labor, for the saving of time, and for the extraction of the copper with a very small loss, I can, from our working results, fully endorse your process as one that with us has given great satisfaction. Any further information desired I will furnish, so far as able, with pleasure. Hoping that this may cover the points in your inquiry, I remain, truly yours,

JAMES E. CLAYTON.

Of the workmen in Belgian mines 15 per cent. of those employed in coal mines underground, and 50 per cent. of those at the surface, are women, while in the manufactories there are 7 per cent. Of children under 16 years there are 11½ per cent., under 14, 10 per cent. in the mines and 4 per cent. in the metallurgical works.

CORRESPONDENCE.

Bismuth Ores.

AN interesting notice by Prof. SILLIMAN in the last number of the ENGINEERING AND MINING JOURNAL, on the occurrence of sulphid of bismuth in Utah, contains the remark that this mineral species is rare in North America, and so far as he is aware not found in sufficient quantities to have a commercial value. I beg to call attention to a paper on bismuth read before the Institute of Mining Engineers, May 23, and published in your Journal July 23, 1872, in which I describe the occurrence of this rare species in not inconsiderable quantities, both in Ontario and New Brunswick, and give at the same time an account of a moist process which may be successfully used for its metallurgical treatment.

INSTITUTE OF TECHNOLOGY, T. STERRY HUNT.
BOSTON, MASS., August 6, 1873.

The Prospects of British Ironworks.

A FRIEND in one of the centers of the English iron districts writes us privately a letter, from which we extract the following, for the sake of the views it presents upon the subject of the future prospects of the iron business in that country:

Your issue, June 24, is before me, and I noticed two small articles, in which you take for granted, as accepted facts, some silly remarks which have been made in the *Ironmonger* and the *Colliery Guardian* about the collapse of our export trade and the power we possess over foreign markets. I beg to assure you that such remarks as are now being made in the columns of the newspapers of this country about the importation of American strip iron, etc., etc., are very far from the truth, and are causing considerable amusement among the manufacturers of this district. It's true enough that we are not sending you the amount of goods we once did; but if we do not send them to the United States our merchants are daily finding new markets, and our workshops are as full of trade as they can well be. Even with our present prices we could undersell your goods, but for the strange fact that your people submit to such an excessive import duty, as enables a few manufacturers on your side to make fortunes at the cost of the people at large.

Don't believe we are going to ruin so *fast*; we have a large trade on our hands yet, and there is a large world for our energy to display itself.

I do not write these hurried remarks for publication, but only to let you know what a vast amount of rot may pass, even in our newspaper press, for sterling truth.

If this gentleman objects to the remarks in our issue of June 24, we can only regard him as one of those Englishmen who look upon England as divinely ordained to be the world's master in the supply of iron. No wealth of ores in other countries, nor manufacturing ability in other peoples, seems to give them the idea that what has been done in England can be done elsewhere. The English laugh at the political economy of the French, but their own ideas on that subject are so peculiar, that they constantly betray the belief that other nations are going to take great pains to prevent their own natural progress, and all for the sake of leaving England undisturbed in her commanding position. This writer finds it difficult to understand that we submit to an import duty. We have already pointed out that but for the two and a half million tons of iron which America is able to contribute to the world's total, the price of the metal in England, during the extraordinary conditions of the past year, would undoubtedly have been much higher than its highest price. Americans submit to a duty because they prefer to control the price of iron themselves rather than be subjected to the views of foreigners.

We commend to the attention of certain American editors the remarks contained in this letter upon the present condition of English trade. Our correspondent is undoubtedly right. "It is next to an impossibility for a nation to lose all its trade at a blow, and it is quite probable that the English ironworks will be busily active for generations to come. It is by no means uncertain that their production will diminish from any cause but the exhaustion of their ore supply.

On the Copper Deposits of the Blue Ridge.

III.

The workings at Ducktown have, for some time past, been confined for the most part to the East Tennesse mine, where a depth of about fifty fathoms has been reached in the unchanged pyritous lode. The chief workings are now in the 30-fathom and 40-fathom levels, and the amount of ore in sight is very large. The single shaft, which cuts the inclined lode, being insufficient for the necessities of the working, a second shaft is now in process, and will, when completed, greatly increase the productive power of the mine. A large part of the ore, as broken, will give five or six per cent. of copper, but as much more, which contains only about one-half this amount, is sent to the dressing-works, where it is crushed by wet stamping, and raised by washing to six per cent., the large proportion of iron-pyrites present not permitting a higher degree of concentration. The ores are roasted in heaps (the dressed ore being cemented together by a small addition of lime), and the product smelted in a blast-furnace, yielding a matte of about twenty-five per cent., which is again heap-roasted and smelted a second time, with some additions, yielding black copper and rich matte, which are further treated in reverberatories. The fuel used in the various processes is wood and charcoal. The produce of Ducktown in 1872 is said to have been about 750 tons of ingot copper, but the amount of ore raised in June equalled nearly 100 tons of copper, and will probably soon be greatly increased by the further openings at the East Tennessee, and by the workings in progress at the Mary Mine, which is now yielding some rich black ore, and carries immediately beneath this a yellow ore of about six per cent., as broken. In the earlier history of mining in this region, it is known that large quantities of similar ores were found, but were neglected at a time when the rich black ores were alone considered valuable; and the facts seem to warrant the conclusion of Capt. AUGUST RAHT that Ducktown might be made to yield enormous quantities of ores holding three or four per cent. of copper.

Meanwhile, the great drawback to the prosperity of this region is the cost of fuel. The smelting of low-grade ores has rapidly consumed the forest around, and the price of wood has risen to $2.50 a cord, and even higher. A railway of about forty miles would connect these mines with the East Tennessee R.R. at Cleveland, and make mineral fuel accessible, but until that shall be done the cost of copper-smelting under the present system must augment.

In 1866, according to the report of Messrs. TRIPPEL and CREDNER, the cost of smelting ten per cent. ores at Ducktown was equal to nine cents for the pound of ingot copper, and the cost to-day for producing it from ores of six per cent. is certainly over eleven cents the pound. At the present price of copper, the operations of mining and smelting at Ducktown are doubtless profitable, conducted as they are with great judgment and skill under the direction of the Messrs. RAHT (for whose courteous attentions my best thanks are due); but should copper again fall to twenty cents the pound, it would seem to be impossible to work these mines with profit. What is needed for this region is the introduction of a moist process, which, requiring a less consumption of fuel and labor, shall enable copper to be produced at lower rates.

The Ducktown lodes are, however, valuable, not only for their immense stores of copper, but as a source of sulphur. The massive ores now broken and smelted for copper would probably yield 30·0 per cent. of sulphur; and were sulphur alone the object, there are great portions of the lodes in which cubic pyrites predominate over the pyrrhotine, often to the exclusion of the latter, giving rise to nearly pure bisulphid of iron, with 50·0 per cent. or more of sulphur. The sulphur for the acid-manufacture of Great Britain is now in large part supplied by pyrites, chiefly from Spain, while the acid works of this country are still for the most part dependant on Sicilian sulphur, for the reason that available deposits of pyrites are not accessible to our manufacturers. At the present time sulphur ores from Ontario and from Quebec are brought to the vicinity of New York; and a pyrites from the vicinity of Richmond, Va., is transported to Philadelphia, where it is made into sulphuric acid for the treatment of the mineral phosphates brought from Charleston, S.C., the manufactured superphosphate of lime being shipped southward to enrich the cotton lands of South Carolina and Georgia. The great importance of this substance as a fertilizer, and the desirableness of manufacturing it in the South, and with the sulphur which abounds there, has already attracted the attention of clear-sighted men, who have looked forward to the extension of a railway from Walhalla, S.C., across the mountains of the Blue Ridge to Ducktown, thus bringing the phosphates of the sea-board in direct communication with the sulphur ores of Ducktown. The sulphur which these ores contain is, of course, lost in the present mode of treating them; but it is to be noted that pyrites holding but a small proportion of copper may be used with great advantage in the manufacture of acid, since the copper extracted from the residues may be made to pay the whole cost of the pyrites. Such a scheme, could it be realized, would be very important to Southern industry; but the remoteness of these deposits, and the length of railway required, some eighty miles, are serious difficulties in the way of its execution, and we naturally turn to the more accessible deposits of Southwestern Virginia, referred to in my last letter. It has already been mentioned that these are great interbedded masses or lodes presenting conditions in every way similar to those of Ducktown. They are met with in Floyd and Carroll Cos., and were worked to a considerable extent before the war, yielding, like the Ducktown mines, considerable quantities of rich black ores, beneath which were found in several places yellow ores of considerable richness. These latter, however, as in Tennessee, were then rejected as not being rich enough for shipment. Later, the mines were worked for the account of the late Confederate government, and large quantities of ores were raised and sent, it is said, to Petersburgh to be smelted; besides which the waters from some of the openings yielded a good deal of cement copper. Works on MONNIER'S system were erected here before the war, but for some reason have been abandoned; and later, in 1866 or '67, Mr. A. EILERS established smelting works here, which were worked for some time with skill and success, but were suspended on account, it is said, of some financial difficulties, and have not been resumed. The deposits which I have lately examined are in Carroll Co., Va., and are along an outcrop which has been traced, with some interruptions, for a distance of about seven miles from northeast to southwest, and having a breadth varying from twenty to nearly 200 feet. From various points along this outcrop some thousands of tons of black ores were raised for shipment, some lots yielding from 26·0 to 29·0 per cent. of copper. This ore, as at Ducktown, lies between the gossan above and the unchanged pyritous mass beneath, and had in some places a thickness of six and even eleven feet. The results of the few openings made into the unchanged portions of the lode, the mundic rock, as it is locally named, show that it consists in some parts of nearly pure cubic pyrites, and in others chiefly of pyrrhotine, associated, as at Ducktown, with considerable quantities of yellow copper ores. There seems every reason to believe that exploration in depth would be as productive here as in Tennessee, and would reveal the presence of great quantities of copper ores like those of Ducktown; while the supply of sulphur ores, which the region could be made to supply, is enormous. The position is favorable for development, being in the midst of a fertile region, and only seventeen miles by a good road from Max Meadows station, on the Virginia and Tennessee R.R. It cannot be long before these great deposits will be opened, not only for copper,

but also for sulphur; and then the mineral phosphates of South Carolina, brought by water to Lynchburgh, will there, or at some other point nearer the mines, be converted into fertilizers for the Southern market. The projected Norfolk and Great Western R.R. is to pass by Hillsville, the county seat of Carroll Co., which is not more than four or five miles from these mines.

Boston, Aug. 1, 1873. T. STERRY HUNT.

The Axe Manufacture in Cohoes, N.Y.

WEED, BECKER & Co.'s axe foundry was founded by DANIEL SIMMONS in 1843. Mr. SIMMONS came to Cohoes from Berne, Albany County, where he commenced the manufacture of axes and edge tools in early life, working his way up from the journeyman blacksmith's forge. His partner for about two years was the late LEVI SILLIMAN, and in 1848 the present firm, WM. H. WEED and STORM A. BECKER, became associated with him, under the firm name of D. SIMMONS & Co. Mr. BECKER had been from the beginning Mr. SIMMONS's superintendent, taking sole charge of the mechanical department, the finances, shipping, etc., as well as conducting a large retail store connected with the establishment. It was in a great measure due to Mr BECKER'S untiring industry and excellent business capacity that the enterprise achieved its large success under Mr. SIMMONS. Mr. BECKER still continues in charge of the business in Cohoes.

The manufactory is located on a narrow strip of land between the Mohawk River and Champlain Canal, near the State dam. The original building, erected by Mr. SIMMONS, was about one-tenth the size and capacity of the present establishment. This building is now the north one of the works, and has been considerably enlarged. There are now seven principal buildings, besides a number of smaller auxilliaries. Of these, two are forge shops, a head hammering shop, tempering shop, grinding shop, polishing shop, and iron and steel shop. In these buildings there are also departments for rolling and making polls, bit drawing, turning axe and tool handles, and inspecting, painting, and packing goods. The successive processes through which the piece of metal must go before it becomes an axe ready for the market will be understood by the arrangement of these buildings. The grinding shop contains 45 grindstones, weighing from 3,000 to 6,000 pounds each. These are bought in Ohio, and brought by water to the dock of the company, where the coal for manufacturing is also landed. Six hundred tons of grindstones and eighteen hundred tons of coal are consumed annually. The location is very favorable for the business, on account of the superior facilities of navigation afforded by both the Erie and Champlain Canals, and the nearness to tide water. From these advantages thousands of dollars are saved annually in freights on raw material received, and on goods shipped direct from their works, over any other manufactory in the United States.

The buildings of the establishment cover more than five acres of ground, and the firm are preparing for further enlargements, for which purpose they have ample room.

The water-power is taken from a stone basin on the south end of the State dam, and has proved, even in the severest drouths, more than double the requirements of the business. The dam being located below the point where all the water of the Cohoes Company empties into the Mohawk, an unlimited supply can be relied upon at all times. Hence, the machinery is run without interruption either in winter or summer. Last year extensive improvements were made, resulting in the building of the new State dam, which is fifteen inches higher than the old one, and free from leakages. While this dam was building, the company put in a new flume head, and in other respects so improved their facilities, that an additional head of five feet of water was secured. During this period the shops were also greatly improved throughout, and in some instances completely remodeled.

The iron used in the manufacture of axes and edge tools is made chiefly in Cohoes, but for the blades of axes English steel is used. The axes are made by the rolling or turning process, in which the improvements lately made are such as to enable a man and helper to turn off twenty-eight to thirty broad-axes a day—a result that could not have been accomplished in four days twenty years ago. And by the improved rolling-machine, a man and a boy can prepare 1,200 axe-polls ready for the steel in a day. Some hing of a contrast with the days when DANIEL SIMMONS hammered out his half-dozen axes daily on his anvil in Berne. The firm makes both the overlapped and split-in axe, the former having the steel split and placed outside the iron, while in the latter this process is reversed. The other articles manufactured are broad axes, hatchets and adzes, of all kinds, railroad and mining picks, grub-hoes, nail hammers, stone hammers, and mauls, drill and blacksmith's sledges, bush hooks, etc. An important feature is the Spanish, South American and Australian trade, which calls for a large variety of articles, both in axes and edge tools, and has for years been steadily increasing. The axes of WEED & BECKER, which still bear the mark of "D. Simmons & Co.," have been chosen over the rough German axes by the Spaniards and the choppers of British America have for them thrown aside the English axe. In fact, there is hardly a forest in the world that has not felt the impress of the Simmons axe, large shipments of which have been sent to various points in Africa and Asia, as well as the countries already mentioned. DANIEL SIMMONS was the first man in the United States to make axes from cast steel, which work he wrought out in his country blacksmithshop in Berne forty years ago. He was the first in America, and perhaps in the world, to establish a manufactory of these axes. Now they ring in every forest in the world, and the name of DANIEL SIMMONS is a familiar word in every pioneer's tent. Previous to Mr. SIMMONS' time the axe was made from German steel, in which the welding process was effected without borax, but the enterprise at Cohoes has done away with these unsatisfactory implements. The second person to establish an axe factory in the United States was SAMUEL COLLINS, who founded a large establishment in Connecticut in 1836.

WEED, BECKER & Co., employ 250 hands, producing a daily average of one hundred dozen axes and sixty dozen edge tools of various kinds. The pay-roll is $15,000 per month. The average value of the annual production of the works is $500,000.

The manufacture of axe-polls forms an important part of the work done by the Cohoes Rolling Mill, MORRISON, COLWELL & PAGE proprietors. The establishment consists of several buildings; the main department, 150 by 175 feet, contains six double puddling and four single heating furnaces, one scrap furnace, one train of rolls for rolling puddle bar iron, one merchant mill and train, and one small mill train. About 300,000 polls are made yearly, and three of BLAKE'S machines, the invention of LEVI DODGE, of Waterford, are used in making them. The capacity of these three machines, worked by two men each, is about 1,000 poll's per day. The works also make a speciality of gas and steam pipe iron, blades for stone saws and other manufactures. About 6,000 tons of bar iron is worked up yearly.—Condensed from *Iron Age*.

MINING SUMMARY.

Lake Superior.

From the London *Mining Journal:*

SIR,—I have not had time to write for quite a lengthened period, though of late I have been interested in some objects that have came up for discussion, and on which I might offer some ideas from a Lake Superior stand-point, had I the time to do so.

Your readers for the most part must be aware that "good times" have been and are being experienced in the iron and copper regions of Lake Superior. Iron mining is receiving a great deal of attention, the outlay necessary to open a mine, and the time required to get the ore into market, being trifling. Mine after mine—or rather quarry after quarry—of the richest iron ore is being opened up, and the ends seem to be as far off as ever, for the iron industry of Lake Superior seems to be as yet in its infancy. A largely increased production will be the result of this season's work, and this must continue while iron is anything like the price of the past year or two.

This season's production of copper will not, in all probability, be a material increase over last year. The older mines will, as a whole, maintain their standing. Two or three that have been idle are again in working order, but 800 tons of ingot copper from them would be a good business. Any important addition must come from the Calumet and Hecla Mine. The product of this concern last year was over 9000 tons of 80 per cent. mineral. This year, so far, the monthly product has been increased, until in May it reached for that month the enormous quantity of 1038 tons. It would be useless to offer anything further to show that the mine named is the best in the world. The rock taken from it when it is stamped produces from 5 to 6 per cent. of mineral, the amount handled monthly being from 18,000 to 20,000 tons. The length of lode would probably be about a mile. All the rock broken is sent to the stamp-mill, and so rich is it in places that it is with extreme difficulty holes are drilled in the lode.

The value of copper raised in May month is not less than $500,000, and the cost of production not more than $150,000. This rate of production would make the profits of the current year larger than for 1872, when they exceeded $3,200,000. This mine is, of course, an exception, and stands so far ahead of the others as to be an anomaly; but recent developments, and statements made regarding other properties, lead to the conclusion that in a year or two new mines will be opened which, if not equal to it in production, will range ahead of anything else in the country. A product of $200,000 is looked for this year from both the Quiniog and Central Mines.

Ontonagon County has been doing a good deal of talking over a discovery of silver. Mining has been commenced, and quite a little excitement got up. There is no question about the quality of some of the specimens produced, but it will take pretty much the summer to determine what amount of silver is available. Silver mining on the Canadian shore has pretty nearly "fizzled;" there are plenty of good "indications" in the veins of the region, but Silver Islet excepted, the shipments of ore have been but trifling; $400,000 is the estimate set on the ore shipped this spring from Silver Islet, as the result of last winter's work.

Tin in Canada, in paying quantities, is as yet an open question. Some believe that it exists to that extent, more do not. A late rumor says that an extensive tract of the lands has been sold, on condition that the statements made are endorsed by parties coming from England to examine the veins. Another report says that evidences of a "salting" have been discovered: this, if true would not surprise everybody. The most strange part of the affair is that, while there are any number of competent Cornish tin miners on this side, well known to the parties interested, only one has been requested to see and report upon the property. Were outsiders sure that he had no interest in it, they might expect his report to be more explicit. An endorsement by three practical miners, and any number of them are here, would settle the question, and render a special importation for the purpose unnecessary.

The introduction of drilling machinery is at a stand-still. It is difficult to ascertain whether its use is a success, financially, in the various mines; but they stick to it; and as there was no question but that it can be made cheaper than hand labor, it is safe to conclude that in time the economy of using it will be felt.

Immigration into the Lake Superior country has been a steady stream since the opening of navigation. Quite a proportion of the numbers complained of as leaving Cornwall find their way here. There is plenty of work for all who come, and undoubtedly there will be. The inducement is the rate of wages which prevail here. Miners are earning from $65 to $80, and even $100 per month; board costs single men $20 per month. With copper at 30 cents, Lake Superior would afford these rates of wages, only asking that the supply of labor shall be equal to the demand. In the matter of wages Cornwall cannot begin to compete relatively.

The mines here are dry, clean, roomy, well ventilated, and in nearly every instance the deep ones are provided with a man-engine. The hours of labor are more than in

Cornwall, but the miner has his work at his door; he lives in the mine; a few minutes' walk only is necessary to reach his place of labor. The handling of the rock, wheeling, and tramming does not fall to his lot, so that, on the whole, it is questionable whether as much physical force is required here to perform a day's work as would be available in Cornwall if the same system of letting contracts were adopted there. The length and coldness of Lake Superior winters are objectionable, but for the most part exception is only taken to their length. There is no mud in winter, nor does it everlastingly rain, as in Cornwall. The miner's work is underground, and there the cold is no drawback. Creature comforts here are more abundant, everybody lives well, and every facility is afforded to those who have a taste for drinking. An advantage that Cornwall affords is the number and style of its churches and chapels, and better preachers than we find here, but the Cornish miners, as a class, are not educated up to that point where they will forego a good dinner every day for the benefit of having an intellectual treat occasionally. Other reasons might be given why working men, all things considered, would prefer this country, but I think the foregoing are sufficient to show why emigration from Cornwall continues, in spite of the efforts made to stop it.

Now another idea. The labor of one miner in this region, applied to the production of iron or copper, furnishes the world with more of those metals than that of three miners in England. The natural resources are here; these have been held in abeyance from want of men and cheaper labor, and on account of the difficulties of transportation. Time is working wonders on the latter question, and the price of metal admits of current rates of wages. The upward tendency of wages in Cornwall, and throughout England, assists in equalizing the price of labor with this country, and the nearer the approach to an equality the greater the advantage to be derived here. Cornubia is already awkwardly situated, and the outlook for her does not grow clearer to one who would rejoice at her success. MINER.

KEWEENAW CO., LAKE SUPERIOR, MICH., JUNE 18.

California.

AMADOR COUNTY.

GOOD HOPE.—Amador *Dispatch*, July 19: Since the new hoisting works have been put in operation the surplus water has been taken out of the shaft, and the work of sinking and taking out rock has been commenced in good earnest.

KENNEDY MINE.—After a large amount of labor and expense, the old and new shafts have been connected by underground communication, thus giving the miners better facilities for getting out rock, as well as better means of escape in case of fire or other accident. The rock now being taken out is said to be unusually rich, besides being plenty.

CALAVERAS COUNTY.

A GOOD MINE.—Calaveras *Chronicle*, July,10: As we passed through San Andreas last Monday, our attention was attracted to the Lloyd Bros. gravel mine, situated in that village. The claim is an old river bed or channel, varying from 100 to 260 feet in width—the pay strata—from two to four feet in depth and from fifty to sixty feet below the surface. The mine is drained by a tunnel 800 feet long. The gravel is raised out by hoisting works run by water power and dumped into an arastra worked by the same power, an ordinary sluice stream only being required to raise, crush and wash the gravel. The present working force is twelve men.

VERY RICH ROCK.—About the richest quartz we ever saw was brought to town the other day by some parties who recently discovered the lead from which it was taken. The lode is situated near Donnallan's bridge, about seven miles from Mokelumne Hill. The rock was so strung together with gold that it could scarcely be broken in pieces. We did not learn the size of the lead, but we understand that but very little work has yet been done upon it.

PRUSSIAN HILL mine let a contract to sink the shaft 100 feet deeper; about 250 feet in all.

NEVADA COUNTY.

EUREKA MINE.—G. V. *Union*, July 17: The following is from the official report of the Superintendent, Mr. WATT, to the Co. at San Francisco. The report is dated July 12, and says: "Our clean up for the last six days' run of ten stamps is 1,175 ounces of amalgam. We have commenced cross-cutting for the ledge in the bottom east drift. The west shift shows good walls, but no ledge. The sixth level stopes look well, the ledge being large and good. No change in any other part of the mine."

SAN BERNARDINO COUNTY.

ARLINGTON DISTRICT.—*Guardian*, July 12: The mines in this District are becoming to be almost as famous as those in the Clarke and Holcomb Valley Districts. They were first discovered by Mr. SCHELLY, of Anaheim, and the locations have mostly been by citizens of that place. Quite a large quantity of very rich ore has been taken from the mines, which has sold in crude bullion in San Francisco for from $650 to $700 per ton. From the mines the shipment has been made via Anaheim to San Francisco. The leads that have principally been worked, so far, are the Big Blue, Lone Valley, Sonoma and Comet. These mines are situated about sixty miles northeast of San Bernardino, near the old Cusenbary City and fifteen miles from Holcomb Valley. Fifty or sixty men are employed in working them. Two companies are now making arrangements to put up smelting works. The successful development of mines in such rich districts as the Clarke, Holcomb Valley, Ord, Twenty-nine Palms and Liberal, makes it appear as though a new era of prosperity was begining to dawn upon our town and county. The amount of supplies required for these mines—when they get fairly under way—will be no small item, and San Bernardino will be the depot from which they are drawn.

TRINITY COUNTY.

A MINING SPECULATION.—Trinity *Journal*, July 19: J. W. SMILEY and J. G. TROTTER have purchased a number of the old mining claims at Smith's Flat near Douglas City. They intend to put in a large flume, take water in a big pipe from Paulsen's ditch, and try what virtue there is in working old diggings in a scientific manner. Smith's Flat was noted for its uniform good pay, and was worked for a number of years successfully. As the front of the flat was worked away and the bank grew deeper, it became difficult, with the poor facilities for working then known, to strip enough bed rock in a season's work to pay well, and this past winter only one company has worked there. As the necessity for cutting more than one deep bed rock ditch will be avoided by the use of the improved mining appliances now in vogue, it is claimed that the ground that is yet left can be made to pay as well as that formerly worked.

TUOLUMNE COUNTY.

Tuolumne *Independent*, July 9: Confidence has been shut down for reasons unknown, but supposed to be on account of law matters. The engineer is at his post to keep out the water.

The Golden Gate Tunnel is now in 268 feet, and the rock looks better than ever. The iron work for the new mill is being rapidly pushed at the Sonora Foundry, and the lumber is already on the mill site.

FOWLES & Co. have commenced work on their quarrz lode at Arastraville. They have just got the water out,—having been filled up last winter,—and have commenced sinking. This vein is a splendid one, and has yielded rock going $50 per ton.

Hidden Treasure, at Cherokee, has shut down for want of water. The Company will now start in and push their tunnel. The contract has been let to run 80 feet further, when it will strike the lode 150 feet from the surface. When the contract is completed, the tunnel will be in 300 feet.—*Mining and Scientific Press.*

Nevada.

PIOCHE MINES.

[From the Record of July 27.]

We yesterday paid the Havana a visit, to see if the reports of the rich strike were based on the solid foundation of pay ore. The vein showed itself in a narrow stream of pay ore on the surface. A perpendicular shaft has been sunk to the depth of 140 feet, at which point the ledge was cut. It was about five feet wide, with smoothest and best defined walls we have ever seen in the camp, and dipping to the south at an angle of 75 degrees. From this point it gradually widened, till it was necessary to leave it, which was done, and an incline carried down on the foot wall. Where the hanging wall was left, the vein was about nine feet wide. The incline has now attained a depth of 110 feet from the bottom of the perpendicular shaft, and about six feet from the bottom, the rich strike to which we alluded, was made. The rich streak is now fully the width of the shaft, and dipping towards the hanging wall. What is its extent is therefore yet unknown, but about thirty feet above a cross-cut was run fifteen feet, without striking the hanging wall, from which fact it is reasonable to infer that it will prove to be a very large body of ore. Assays of the mass ranged from $120 to $600 per ton.

In the Portland mine they are drifting and stoping on the ledge, in excellent ore. The character of the ore appears to be somewhat different from heretofore, and the change is decidedly for the better. The ledge maintains its size throughout. There are about 150 tons of ore on the dump, sixty of which is first-class high-grade ore. It is the intention to re-commence sinking the main shaft to-morrow and sink another 100 feet. It is now 200 feet deep—a double shaft, each compartment 4x4 in the clear. If anything is to be predicted on present developments, the Portland will soon be, what we have always believed it was, one of the great mines of Ely District. A furnace is in process of erection for the reduction of the heavy galena ores which were found near the surface, and which is very rich in silver. It will be in operation about the 1st proximo.

The Pioche is working the same force as heretofore, and taking out ore as usual. During the past week upwards of 135 tons of ore have been shipped to the Amador mill. Have nearly $5,000 in bullion on hand, and expect to ship $10,000 this month. No particular change to note in the stopes and drifts. The new shaft is down 150 feet. It is a double shaft, each compartment 4½x4 feet inside the timbers.

We are still without reliable intelligence regarding the Newark mine. To the many stockholders who have applied to us to know why such intelligence is not made public in our mining review, we have only to say we cannot obtain it.

At the Raymond & Ely the hoisting works are being rapidly put in place, and we learn from Captain Day that he expects to resume work on the mine about August 1st.

Colorado.

NORTH DAILY DISTRICT.

From the *Miner* of July 31.

There are at this time, about sixteen to twenty miners and prospectors in this district. Several new lodes are being opened up that promise well. The lodes of this district are large and well defined, not a very high grade of ore generally, but in every instance the ore gets richer as depth is gained. I have not the least doubt or fear but North Daily District will be admitted to the bar of silver-producing districts as soon as her large lodes shall be developed.

The Great Bear lode is most developed of any and has increased in richness every foot gained in depth.

It is somewhat demoralized at this time, from a heavy landslide that came down upon her, closing both tunnels and sending about forty tons of good dressing ore down the gulch on its way to New Orleans. Work will commence again in a week or ten days with two shifts, and continue until the mine is fully developed. It is fifty-two feet wide, and opened 600 feet in length, showing mineral at every opening.

The Mountain Lion, on the north slope of Red mountain, is being opened by a tunnel by LEWIS SAYLER and FRANK KOSER; it looks well and bids fair to be a valuable lode—the tunnel is in on the vein twenty-five feet.

The Alida lode, situated on the north side of Middle Clear Creek, at the base of Big Bear mountain, is being opened by ANDERSON, PECK, and WIENER—the same parties are opening the Ruth lode on the opposite side of the creek about three hundred feet below. Both lodes are large and look well, and when fully developed can not fail to be of great value.

The Silver King, situated on the north side of Big Bear mountain, about one half mile from the creek, will be opened by the same parties and worked all winter, the blossom assay is rich.

Two new discoveries have been made the last week, one on the south east slope of Red Mountain, near the summit, by H. C. COWLES and JOHN FOIST, named Red Mountain Lode. It is a wonderful lode, from forty to fifty feet wide, carries ruby and gray copper and is almost inaccessible to a human being. The other lode, discovered by KASER and EARLY, is situated on the south slope of Russel Mountain, named the Daily Chief.

Advertisements.

The rates of advertising, compared with those of other weekly industrial publications, are very low, especially when the class of consumers among which its large circulation is almost entirely confined, is taken into consideration.

The special advantages of the ENGINEERING AND MINING JOURNAL, *as a medium for advertisers, are so great and so widely known that it may seem almost needless to call attention to them. It is extensively circulated among the engineers of the country and takes a position in this respect before any other publication of the kind. It has a large and constantly increasing circulation among miners and mine owners, and men connected with mining operations generally. As it is the only paper in the country that makes this subject a specialty it has this field entirely to itself, and is the only direct and reliable means of reaching this class of persons. Being kept on file by almost every subscriber, it is doubly valuable as a permanent means of keeping an advertisement before the public. It is the Organ of the* AMERICAN INSTITUTE OF MINING ENGINEERS, *and is regularly received and read* BY ALL THE MEMBERS AND ASSOCIATES *of that large and powerful society.* THE ONLY ONE OF THE KIND IN THIS COUNTRY. *It is therefore the best medium for advertising all kinds of machinery, tools and materials used by engineers or their employés. It is the recognized organ of the coal trade, and is taken extensively by the trade throughout the country, and presents the very best means of reaching that very important class of men.*

Rates of Advertising.

Back Page.....40 cents a line.
Inside Pages.....35 cents a line.

Engravings may head advertisements at the same rate per line, by measurement as the letter-press.

MISCELLANEOUS.

WM. A. SWEET, Pres't. GEO. W. HARWOOD, Treas. FRED. B. CHAPMAN, Sec'y.

SWEET'S MANUFACTURING CO.,

SYRACUSE, N. Y.,

MANIPULATORS OF

Bessemer Steel,
Siemens Martin Steel,
Cast Steel,
Blister Steel

MANUFACTURERS OF

Sweet's Cast Steel Crow Bars,
Sweet's Cast Steel R. R. Bars,
Sweet's Oil-tempered Seat Springs,
Sweet's Excelsior Steel Tire,
Swede's Spring Steel,
Cast Spring Steel,
English Spring Steel,
Sleigh Shoe Steel,
Cutter Shoe Steel,
Frog Point Steel.

Nov 19:1y

United Royal Smelting Works

OF THE

Kingdoms of Prussia and Saxony.

GENERAL AGENCY:

R. J. ROBERTSON, HAMBURG, GERMANY

REPRESENTATIVE FOR THE UNITED STATES:

H. ROBERTSON, 149 BROADWAY, NEW YORK

During a temporary absence of Mr. H. ROBERTSON, and until further notice, all communications should be addressed to

R. J. ROBERTSON,

Hamburg, Germany.

MISCELLANEOUS.

LEHIGH ZINC COMPANY.

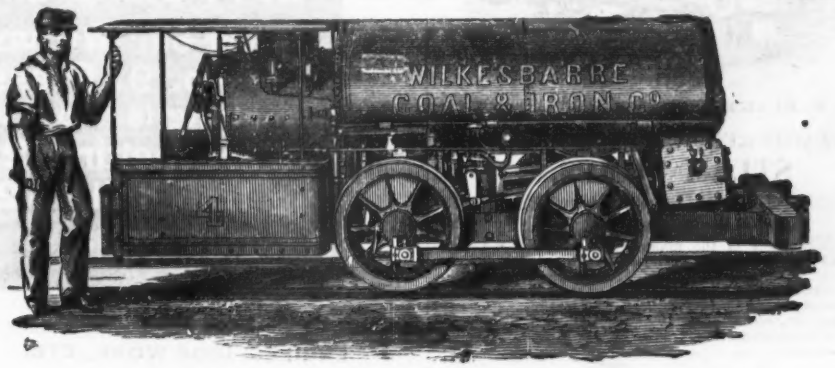
GORDON MONGES, Treasurer. B. C. WEBSTER, President.

WORKS, BETHLEHEM, PA. OFFICE, 333 Walnut Street, Philadelphia

JOHN JEWETT & SONS, AGENTS, 182 FRONT STREET, NEW YORK.

OXIDE OF ZINC, SPELTER, SHEET ZINC.

Jun28:1y SPIEGELEISEN CINDER FOR BLAST FURNACES.



IMPROVED DIRECT-ACTING MINING LOCOMOTIVE

Gauge, two feet six inches or upwards; Hight above rail, five feet four inches; Width over all, five feet one inch. Adapted to burn Anthracite or Bituminous coal or coke.

Materials and Workmanship Equal to those in Full Gauge Railroad Locomotives,

Guaranteed to pass curves of twenty-five feet radius and haul on a level track in good condition.

Three Hundred and Forty Gross Tons of Cars and Load.

For Photograph and full particulars, address **BURNHAM, PARRY, WILLIAMS & CO.**

Feb:7-1y:eow Baldwin Locomotive Works, Philadelphia.

COOPER'S GLUE AND REFINED GELATINE

COOPER, HEWITT & CO.,

NO. 17 BURLING SLIP, NEW YORK.

Bar Iron, Braziers' Rods, Wire Rods, Rivet and Machinery Iron, Iron and Steel Wire of all Kinds, Copperas, &c., &c.

RAILROAD IRON, COOPER WROUGHT IRON BEAMS AND GIRDERS,

Martin Cast-Steel, Gun-Barrel and Component Iron,

PUDDLED AND REFINED CHARCOAL BLOOMS,

Ringwood Anthracite and Charcoal Pig Iron.

Works at Trenton and Ringwood, N. J.

may 17:1y

To INVENTORS AND MANUFACTURERS

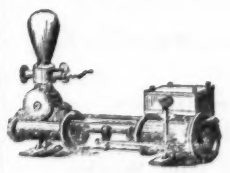
The Managers of the 42d Exhibition of the American Institute, of the City of New York, beg to announce, that the Exhibition Buildings on 2d and 3d Avenues and 63d and 64th Streets, will be open for the reception of heavy Machinery August 18th and for other articles, September 1st 1873. The Exhibition will be formally opened September 10th.

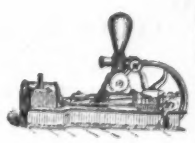
For particulars, address "General Superintendent, American Institute, New York."

May 27-Sept. 10

GUILD & GARRISON,

manufacturers of Steam Pumps for all purposes, both Direct-acting and Balance-Wheel.





For sale at the Steam Pump Works, 34 to 44 First street, Williamsburg, N. Y. 1y

---

E. B. BENJAMIN,

10 BARCLAY STREET,

NEW YORK CITY,

Importer and Manufacturer of all kinds of apparatus for mineral and chemical analysis. *Laboratory and Assaying Tools, Prospecting and Mining Implements,* accurate Balances and Weights, Furnaces, Tongs, Freiberg Scarifiers, French Cupels and Assay Cups, Flasks, Dippers, *Crucibles,* etc. Complete *Blowpipe* sets for gold and silver tests. Compasses, Becker's Ingot Moulds, Lenses, Evaporators, etc., etc.

For better description of apparatus and prices, see the large *Illustrated Catalogue,* beautifully gotten up, in cloth,

Price - $1 50 per Copy.

1y-apr8-73

SUPERIOR RAIL MILL.—CAPACITY: 1,000 TONS PER WEEK.

Harbaugh, Mathias and Owens,

Manufacturers of

RAILROAD IRON,

Office, corner Fifth Avenue and Smithfield Street, Pittsburgh.

Our central location enables us to draw from both sides of the Allegheny Mountains Metals and Ores best adapted for making a No. 1 Rail, and together with our Improved Machinery, are a sufficient guarantee of our ability to produce Rails of a quality unsurpassed for durability and strength, by any foreign or domestic manufacture.

New Patterns, of any desirable weight, made to order on Short Notice.

We respectfully solicit orders for New Rails, or Re-rolling. June 26.1y

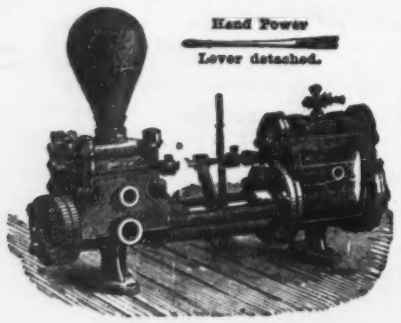
---

SCHOOL OF MINES, COLUMBIA COLLEGE.

FACULTY.—F. A. P. BARNARD, S.T.D., LL.D., PRESIDENT, T. EGLESTON, Jr., E. M., Mineralogy and Metallurgy; F. L. VINTON, E. M., Civil and Mining Engineer; C. F. CHANDLER Ph. D., Analytical and Applied Chemistry; JOHN TORREY, M.D., LL.D., Botany; C. A. JOY, PH. D., General Chemistry, W. G. PECK, LL.D., Mechanics; J. H. VAN AMRINGE, A.M., Mathematics; O. N. ROOD, A.M., Physics; J. S. NEWBERRY, M.D. LL.D., Geology and Paleontology. Regular courses in Civil and Mining Engineering; Metallurgy; Geology and Natural History; Analytical and Applied Chemistry. Special students received for any of the branches taught. Particular attention paid to Assaying. For further information and catalogues, apply to

DR. C. F. CHANDLER,
Nov. 21:1y Dean of the Faculty.

MACHINISTS' SUPPLIES.

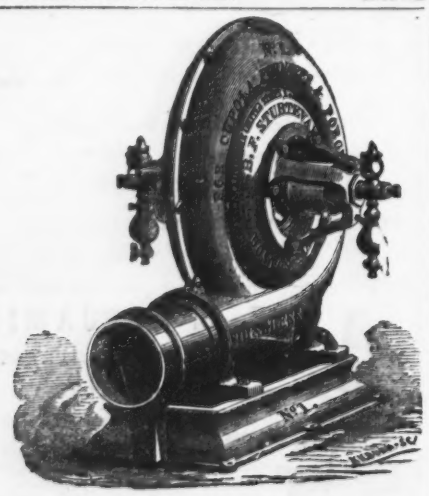


GEO. F. BLAKE & CO.,
MANUFACTURERS OF BLAKE'S PATENT
STEAM PUMPS.
No. 79 LIBERTY STREET, NEW YORK.
Factory 61 Chardon St., Boston, Mass.

A specialty made of the manufacture of DOUBLE-ACTING PLUNGER PUMPS for mining purposes—combining economy of space, capacity, and great durability. All wearing parts made of composition metal.

Also, Boiler Feed Pumps, Fire Pumps, Tank Pumps, Wrecking Pumps, etc., etc.

Send for illustrated Price Circular. m-26 3m



B F. STURTEVANT'S
PATENT IMPROVED
PRESSURE BLOWER,
FOR CUPOLA FURNACES AND FORGES.

Also manufacturer of the Sturtevant Patent Improved Fan Blower and Exhaust Fan. Send for illustrated catalogue.
B. F. STURTEVANT, 72 Sudbury street, Boston, Mass.
n29 1y

KROM'S PATENT DRY ORE CONCENTRATOR
AND COMPLETE MACHINERY FOR CRUSHING SCREENING AND CONCENTRATING ORES.

Minerals and Ores in which the difference of specific gravity is so slight and which are also sometimes in such fine particles as to defy separation by any other machinery or method, are rapidly separated by this Concentrator.

Mr. W. Bement, of Georgetown, Col., concentrating Silver ores, says: "I am satisfied your machines can not be beaten; they are simple, require no power (comparatively,) and do not get out of order."

A comparison is challenged between the results obtained by the approved methods of water concentration and the complete system of dry-ore concentration in the amount of ore saved, quantity concentrated, economy of working, and comfort of the operators and workmen

Parties interested in mining are invited to call at No. 210 Eldridge street, New York, where they may see a machine in operation and have samples of their own ores crushed and concentrated.

For information and circulars, apply to
S. R. KROM,
No. 210 Eldridge street, New York City.

WILLIAM F. McNAMARA,
SOLICITOR OF PATENTS
AND COUNSELLOR-AT-LAW.
No. 37 PARK ROW NEW YORK, ROOM 22.
Advice in Patent Law given free. n7s8:tf

MISCELLANECUS.

The Bessemer Steel Works,
of John A. Griswold & Co.
Troy, N. Y., May 3, 1872.

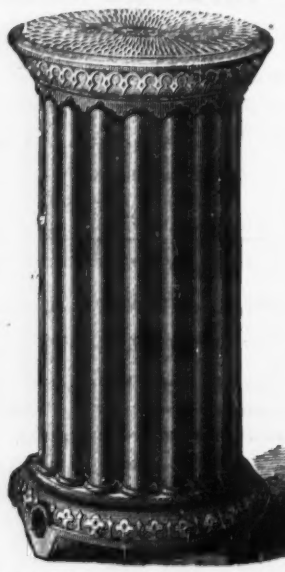
B. F. Sturtevant, Boston, Mass.,

Dear Sir, We have changed your No. 8 for your No. 9. Pressure Blower. The time in melting is about the same with either Blower. We are melting 225,000 lbs. (112½ tons,) Pig Iron daily, (20 hours running time.) It works well.

BARNEY MEE, Supt.

ENGINES, IRON WORK, ETC.

JOSEPH NASON'S VERTICAL TUBE RADIATORS



IN VARIOUS SIZES AND PATTERNS

JOSEPH NASON & CO., 61 BEEKMAN ST., corner of Gold street.—WROUGHT and CAST-IRON PIPES; all kinds of STEAM and GAS FITTINGS; Apparatus for WARMING and VENTILATING BUILDINGS.
JOSEPH NASON. HENRY R. WORTHINGTON.
nov29-1y

THE
American Trade Journal.

Particularly devoted to the general trade interests of the country, has an established commercial circulation exceeding

40,000 COPIES,

extending throughout the United States, and to Great Britain, Brazil, Mexico, Central America, Buenos Ayres, Chili, Australia and Japan.

It has been the agent for the successful introduction o notice and sale of American productions in the countries named; and, by a steadily increasing circulation in that direction, has proven the most valuable medium for our trade interests abroad as well as at home.

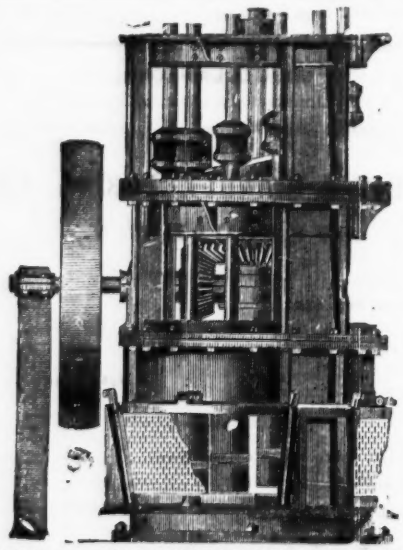
Published Weekly and Monthly under the auspices of the

BOARD OF TRADE.

F. H. ROLLINS, 69 & 71 Broadway, New York
Oct.1.1 y

W. B. COGSWELL,
Civil & Mechanical Engineer.
SPECIALITY:
Blast Furnace Construction.
P. O. Address
Franklin Iron Works,
Oneida County,
Nov 19:1y N. Y.

MINING MACHINERY, ETC.



HOWLAND PATENT ROTARY BATTERY

of 12 stamps. It requires no frame to put it up. The best Battery ever used for amalgamating gold, or crushing silver ores, dry or wet. Can be put up on a mine in running order for one-half the price of the straight battery, and in three days after its arrival at the mine. 12-stamp battery, 20,000 pounds, with frame complete; 6-stamp battery, 7,000 pounds. Every mill run at shop before shipping.

CALIFORNIA STAMP MILLS,

All the various styles of Pans, Amalgamators, Rock Breakers, Separators, Settlers, Concentrators, Dry or Wet, for working Gold, Silver or Copper Ores, the same as built in California and at lower prices. SHOES AND DIES made of the best white iron. Send sizes and we will make patterns and forward Shoes and Dies at low prices. Engines, Boilers and fixtures, and other Machinery made to order.

☞ Send for a Circular.
Address MOREY & SPERRY,
Jan 6:6m 95 Liberty Street New-York.

THE PULSOMETER,
OR
MAGIC PUMP.

The **simplest, most durable** and **effective** pump now in use. Adapted to **all situations,** and performs all the functions of a steam pump without its consequent wear and care. No machinery about it. Nothing to wear out. Will pump **gritty** or **muddy** water without wear or injury to its parts. It cannot get out of order.

C. HENRY HALL & CO.,
20 Cortlandt Street, New York City.

JOLIET IRON AND STEEL COMPANY,
MANUFACTURERS OF
PIG METAL, RAILROAD IRON,
AND
BESSEMER STEEL RAILS.
Works at Joliet, Ill.
Office, 94 Washington street, Chicago.
A. B. MEEKER, Pres.
junel0:6m J. H. WRENN, Treas. and Sec.

MISCELLANEOUS.

THE SELDEN DIRECT-ACTING

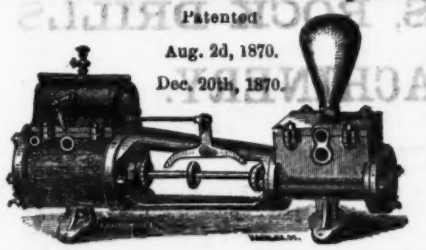
STEAM PUMP

A. CARR, Manufacturer & Proprietor.

Patented

Aug. 2d, 1870.

Dec. 20th, 1870.



Combining simplicity and durability to a remarkable degree Its parts are easy of access, and it is adapted to ALL PURPOSES for which Steam Pumps are used.

AS A MINING PUMP

It is unsurpassed. Also,

Steam, Gas and Water Pipe, Brass Work. Steam and Water Gauges, Fittings, etc. etc.

CARR PATENT STEAM RADIATOR.

Send for Price-List and Circulars.

Address A. CARR.

feb15.72:24 43 Courtlandt Street, New York.

EDWARD SAMUEL,

Iron Broker and Commission Merchant,

332 WALNUT STREET, PHILADELPHIA.

Solicits consignments and orders to purchase or sell American or Foreign Raw or Manufactured Irons.

Dec. 31:tf

THOMAS M. DROWN,

ANALYTICAL CHEMIST

AND

CONSULTING METALLURGIST.

1123 GIRARD STREET,

PHILADELPHIA.

J. W. HARDEN & SON,

MINING ENGINEERS,

430 *Walnut Street, Philadelphia.*

Coal and Iron Ore properties reconnoitred and reported on. General plans, Working drawing and estimates of Mining structures and Machinery supplied. Periodical underground Surveys made and kept up. Geological and Geographical Surveys made. April 12.1y

RICHARD P. ROTHWELL,

MINING ENGINEER,

ROOMS 107, 108, 109,

71 Broadway, New York.

COAL AND IRON A SPECIALITY.

P. O. Box 2167 N. Y.

MAYNARD & VAN RENSSELAER,

Mining and Metallurgical Engineers,

Experts in Iron, Analytical Chemists,

34 Cliff Street, New York.

GEO. W. MAYNARD. SCHUYLER VAN RENSSELAER

INSTRUCTION.

CIVIL AND MECHANICAL ENGINEERING AT the Rensselaer Polytechnic Institute, Troy, N. Y. Instruction very practical. Advantages unsurpassed in this country. Graduates obtain excellent positions. Reopens Sept. 17th. For the Annual Register, containing improved Course of Study, and full particulars, address PROF. CHARLES DROWNE, Director. jy15:8t

ISIDOR WALZ, Ph.D.

ANALYTICAL AND CONSULTING CHEMIST.

No. 18 EXCHANGE PLACE,

NEW YORK.

WOOD ENGRAVING

EXECUTED AT THE OFFICE OF

The Engineering and Mining Journal.

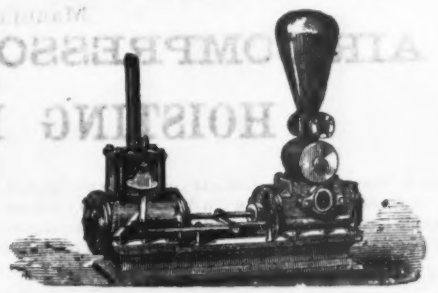
27 PARK PLACE, NEW YORK CITY.

"ENGINEERING."

"The leading Engineering Journal of the world," indispensable to every Civil, Mining, or Mechanical Engineer, can now be obtained post-paid at $9 00 currency, by remitting Post Office order to NEW YORK OFFICE "ENGINEERING," 52 Broadway.

STEAM PUMPS.

Niagara Steam Pump Works.



This Pump has taken the first premium at every Fair in the United States where there has been a practical test.

CHARLES B. HARDICK,

No. 23 ADAMS STREET, BROOKLYN, N. Y.,

Sole Manufacturer of

HARDICK'S PATENT DOUBLE-ACTING

STEAM PUMPS AND FIRE ENGINES,

Patented in England, Belgium and France. Send for circular. feb-13-1y

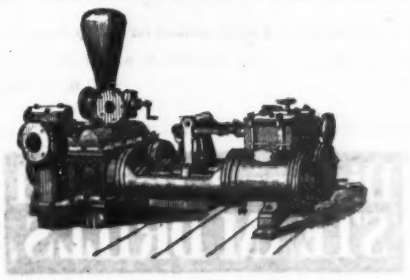
HYDRAULIC WORKS.

MANUFACTORY.

BROOKLYN, N. Y.

Steam Pumping Engines, Single and Duplex, Worthington's Patent, for all purposes, such as Water Works Engines, Condensing or Non-condensing; Air and Circulating Pumps, for Marine Engines; Blowing Engines; Vacuum Pumps, Stationary and Portable Steam Fire Engines; Boiler Feed Pumps, Wrecking Pumps,

MINING PUMPS.



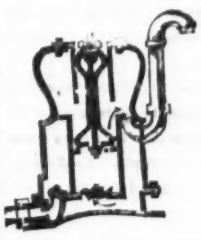
Water Meters, Oil Meters; Water Pressure Engines.

Steam and Gas Pipe, Valves, Fittings, etc. Iron and Brass Castings.

Send for Circular.

H. R. WORTHINGTON,

jan2-1y 59 Beekman street, New York.



MINING PUMPS.

Well Pumps,

AND PUMPS FOR ALL PURPOSES.

Simple, cheap, and effective.

J. D. WEST & CO.,

40 Cortlandt St., N. Y.

J. CLAYTON'S

Patent Fly Wheel

STEAM PUMP,

AND

STEAM ENGINE

COMBINED.

These pumps are the cheapest first-class pumps in the market.

All sizes made to order at short notice.

JAMES CLAYTON, 24 & 26 Water st.,

Nov18-tf Brooklyn, N. Y.

Office: 50 & 52 John street, New York.

COAL SHIPPERS.

THE NEWBURGH ORREL COAL COMPANY

Mines at Newburgh, Preston Co., W. Va.

Company's Office, No. 52 S. Gay St. Baltimore, Md.

C. OLIVER O'DONNELL.....President.

CHAS. MACKALL.....Secretary

This Company offer their very superior Gas Coal at lowest market prices.

It yields 10,996 cubic feet of gas to the ton of 2,240 lbs. of good illuminating power, and of remarkable purity; one bushel of lime purifying 6,792 cubic feet, with a large amount of coke of good quality.

It has been for many years very extensively used by various Gas Companies in the United States, and we beg to refer to the Manhattan, Metropolitan, and New York Gas Light Companies of New York, the Brooklyn and Citizens' Gas Light Companies of Brooklyn, N. Y., the Baltimore Gas Light Company of Baltimore, Md., and Providence Gas Light Company, Providence, R. I.

The best dry coals shipped, and the promptest attention given to orders. sep21-1y

Philadelphia and Reading

COAL & IRON CO.

OFFICE, No. 9 PINE STREET.

E. A. QUINTARD, Agent.

NEW YORK, March, 1873.

OFFER

Hard and Free Burning White Ash Coals,
Schuylkill Red Ash,
Alaska Red Ash,
Shamokin White Ash,
Shamokin Red Ash,
North Franklin,
Lorberry, and
Lykens Valley Coal,

ON BOARD, AT PORT RICHMOND,

PHILADELPHIA,

OR

DELIVERED IN NEW YORK,

AND AT

ALL PORTS ALONG THE SOUND AND HUDSON RIVER.

Circulars of Prices will be issued on the 20th of each month

COXE BRO.'S & CO., CROSS CREEK COLLIERY, MINers and Shippers of the Celebrated

Cross Creek Free Burning Lehigh Red Ash

COAL.

FROM THE BUCK MOUNTAIN VEIN.

OFFICES:

Philadelphia, No. 208 South Fourth street.

Drifton, Jeddo P. O., Luzerne Co., Pa.

Agent in New York, SAMUEL BONNELL, Jr.,

Room 43, Trinity Building,

feb-1 111 Broadway

DETMOLD & COX,

ANTHRACITE AND BITUMINOUS

COALS.

Office, 40 Trinity Building, New York. Jan3-1y

STEPHEN S. LEE & SON,

Miners and Shippers of

GEORGE'S CREEK COAL.

SWANTON MINES,

No. 49 West Lombard street,

may28-tf BALTIMORE.

MARYLAND COAL CO.,

Miners and Shippers of the best George's Creek Cumberland Coal.

Office No. 12 Trinity Building.

W. W. BRAMHALL, Secretary & Treasurer.

A. CHAMBERLIN, President.

jan23.1y JOHN K. SHAW, Vice President.

THE DESPARD COAL COMPANY OFFER THEIR Superior DESPARD COAL to Gas Light Companies throughout the country.

MINES IN HARRISON COUNTY, West Virginia.

Wharves, Locust Point, } Baltimore.
Company's Office, No. 20 South st. }

AGENTS:

PARMELEE BROTHERS, No. 32 Pine street, New York. BANGS & HORTON, No. 31 Doane street, Boston.

Among the consumers of Despard Coal we name Manhattan Gas Light Co., New York; Metropolitan Gas Light Co., New York; Jersey City Gas Light Co., Jersey City, N. J.; Washington Gas Light Co., Washington, D. C. Portland Gas Light Co. Portland, Maine.

Reference to them is requested. b Ag30 1y

"IRON" (WITH WHICH IS INCORPORATED the MECHANIC'S MAGAZINE,) a Journal of Science, Metals, Patents and Manufactures, Engineering, Building, Railways, Telegraphy, Shipbuilding, Factory News, etc., etc.

Subscription, 30 s. per annum, post paid

To be had of all Newsvenders and from the office 90 Cannon street, London, England.

Valuable Coal and Iron Property, Blast Furnace and Farming Lands
For Sale.

(By order of the Comptroller of the Currency.)

Being Part of the Assets of the
Ocean National Bank, of N. Y

The undersigned, Receiver of the Ocean National Bank will offer for sale all that tract of land, and the structures and improvements thereon, together with the franchises and privileges belonging thereto, known as the

IRONDALE COAL AND IRON PROPERTY,

and formerly known as the Estate and Works of

The Franklin Iron and Coal Co.

Said Lands and Works are situated in Preston County, West Virginia, on the line of the Baltimore and Ohio Railroad, near the Grafton Junction, and are connected therewith by a branch railway of uniform gauge and construction; distant 270 miles from Baltimore, 92 miles from Cumberland, 109 miles from Wheeling, 114 miles from Parkersburgh (and 65 miles from Pittsburgh by the line of the Pittsburgh and Charleston Railroad now building southward across West Virginia), by means of which road it has access to the markets of the East and West, and will shortly also have access to the markets of Pittsburgh and the magnetic ore deposits of Virginia and the Kanawha.

The **TRACT OF LAND** embraces 1320 acres, of which 220 are under cultivation, the remainder being covered with a heavy growth of valuable Timber.

It is also underlaid by **THREE DISTINCT WORKABLE VEINS OF GOOD COAL**, accessible at or near the surface, 3, 4 and 8 feet in thickness, respectively, which have been tested and worked on this and adjacent properties for many years. The coal yields a fine **lustrous hard-grained coke, suitable for iron making.**

There are, also, in close proximity to the bituminous coal, **THREE SEPARATE BEDS OF IRON ORE**, of the variety known to miners as "**CLAY IRON STONE**," so largely in use in English furnaces, ranging from 22 inches to 4 feet in thickness, and so easily mined that it can be placed at the Furnace-stack at $1 50 per ton.

In juxtaposition with the Iron Belts are **LIMESTONE** suitable for fluxing purposes, **FIRE-CLAY** and building **SANDSTONE** suitable for constructing Furnaces, Ovens, etc.

Among the permanent **Structures and Improvements** erected for the most part by the Company, are:

One Hot-Blast Furnace, 39 feet stack, 11.9 bosh.

Two Blowing Engines, 80 horse power, made by Sweeney & Son, of Reading.

Hot Blast Apparatus, 28 feet stoves.

Four Miles of Railroad, 4-8½ gauge, sidings, switches, 55 and 60 pound rail, well railed and ballasted.

One Sawmill. Turbine wheel, circular saws, carpenter and tool shop complete.

Foundry, including cupola, moulds, castings, patterns, etc.

Machine and Blacksmith Shop, with lathes, drills, etc.

30 Workmen's Dwelling Houses, double and single, gardens attached, in good order.

Storehouses, Engine House, Offices, Sheds, Coking Pits, Trestles and all the Tramways, Drifts, Openings, Stables and other structures and excavations necessary for the operation and maintenance of an extended production and shipment of iron and coal.

The works are now in blast and have been in successful operation for several years. They were laid out, worked and enlarged under the immediate supervision of one of the largest manufacturers, the whole expenditure on the property being upward of **$700,000.** The Blast Furnace has a capacity of turning out ten to twelve tons of pig iron per day from the ores on the estate, which product has ranked as No. 1 and No. 2 Foundry (gray forge and white iron) in the Ohio River markets. The capacity can be greatly increased at but little cost, by the erection of a second furnace, the site for which is selected.

There are but few, if any, sites more advantageous for the successful continued and profitable manufacture of iron; the fuel, the flux and the ores being all on the same property, and connected with the furnace by rail. Pig-iron, with the existing facilities, has been made by the season at a cost of $18 per ton and this rate can be lessened by improvements in contemplation.

ALSO, A TRACT OF 8000 ACRES OF GOOD WESTERN PRAIRIE FARMING LANDS,

situated in Jackson, Massac, Johnson and Williamson counties, in the southern portion of the STATE OF ILLINOIS, within convenient distance of railroad and river communications and good markets. Said lands are contiguous, and consist largely of rich bottom and prairie soil, interspersed with good streams and ample timber, and appraised at from $5 to $35 per share.

Sealed proposals will be received by the undersigned, at his office for sixty (60) days from July 1, for the purchase of the **West Virginia Tract of Coal and Iron Lands** with the **Furnace** and other **Improvements** entire, as they stand. Also, separately, for the **Illinois Farming Lands**, or any portion thereof—the Receiver reserving the right to reject any or all bids, if it be deemed for the interest of the creditors of the Bank to do so.

Terms—One-third cash: balance in one, two and three years, secured by mortgage.

Title perfect—absolute in the Ocean Bank.

Further particulars and information, Geological and Mining Engineers' Reports on the Virginia property, and detailed descriptions of the Illinois lands, can be had on application to

THEODORE M. DAVIS,
Receiver of Ocean National Bank,
19 NASSAU ST., N. Y.

RAND & WARING DRILL AND COMPRESSOR CO.,

21 PARK ROW, OPPOSITE NEW POST OFFICE, NEW YORK.

Manufacturers of

AIR COMPRESSORS, ROCK DRILLS AND HOISTING MACHINERY.

LIMA, Peru, May 2 th, 1873.

MESSRS. RAND & WARING, Drill and Compressor Co., 21 Park Row, New York:

GENTLEMEN.—The patent rings that you have just sent out for your compressors on the Lima and Chorrillos Railway were the only things wanted to make the compressors a complete success, although they have given entire satisfaction as first set up. Several gentlemen in this place who are competent to judge of such matters speak very highly of your compressors.

Yours, etc., WM. W SEMAN, Superintendent.

COAL YARD, QUARRY, AND CONTRACTORS' APPARATUS.

Andrews's Patents, Noiseless, Friction-Grooved, Portable and Warehouse Hoisters.

FRICTION OR GEARED MINING AND QUARRY HOISTERS.

For Hoisting and Conveying Material to any Distance by Wire Cables.

Smoke-burning Safety Boilers. Oscillating Engines. Double and Single, ½ to 100 horse-power. Centrifugal Pumps, 100 to 100,000 gallons per minute. Best Pumps in the world; pass mud, sand, gravel coal, grain, etc., without injury.

All light, simple, durable and economical.

Send for circulars.

WILLIAM D. ANDREWS & BRO.,
oct-15-1y 414 WATER STREET, NEW YORK.

BACON'S HOISTING ENGINES.

MINES, BLAST FURNACES, PILE DRIVING, CONTRACTORS' USE, &c.
Adapted to Every Possible Duty.

COMPACT, STRONG, SIMPLE AND DURABLE.

Manufactured by **THE SPEEDWELL IRON WORKS,**

OFFICE AND WAREROOM .....36 CORTLAND STREET, N. Y.
WORKS.....MORRISTOWN, N. J. jl 15:tf

THE WIRE TRAMWAY CO.

The CHEAPEST and BEST method for transporting Coals, Minerals, Farm Produce, Sugar Cane, &c., &c.

No Grading or Bridging Required, is not affected by Floods or Snow. Capacity from 50 to 1000 tons per day.

STEPHENS BROS. & CO., Sole Agents for the United States,
187 Broadway, New York City.

Diamond-Pointed STEAM DRILLS.

Recent improvements in connection with the celebrated LESCHOT'S patents have increased the adaptability of these drills to every variety of ROCK DRILLING. Their use, both in this country and in Europe, has sufficiently established their reputation for efficiency and economy, over any other now before the public.

The Drills are built of various sizes and patterns, WITH and WITHOUT BOILERS, and bore at a uniform rate of THREE TO FIVE INCHES PER MINUTE in hard rock.

They are adapted to CHANNELLING, GADDING, SHAFTING, TUNNELLING and open cut work; also to DEEP BORING for TESTING the VALUE of MINES and QUARRIES. TEST ORES taken out, show the character of mines at any depth. Used either with steam or compressed air. Simple and durable in construction and never need sharpening.

Manufactured by
THE AMERICAN DIAMOND DRILL CO.,
No. 61 Liberty street,
feb4:6m. New York.

LAFLIN & RAND

POWDER CO., 21 Park Row, opposite Astor House, New York,

invite attention to their facilities for delivering

BLASTING POWDER, SAFETY FUSE,

ELECTRICAL BLASTING APPARATUS, &c.,

wherever required, from having nine manufactories in different States, beside agencies and magazines at all distributing points. nov. 1:1y

MANUALS OF MATHEMATICAL INSTRUMENTS, MICROSCOPES, ETC.

CHESTERMAN'S TAPES, COMPASSES, &c.

sent to any address on receipt of 10 cents each.

JAMES W. QUEEN & CO.
601 Broadway, New York. 924 Chestnut St., Philadelphia.
Mention Mining Journal. May 10-12t

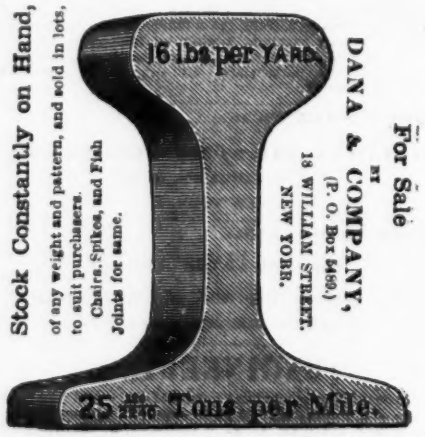
ELLSWORTH DAGGETT,

MINING ENGINEER AND METALLURGIST.

SALT LAKE CITY, UTAH.

June 24-3m

RAILROAD IRON FOR MINES.



Stock Constantly on Hand, of any weight and pattern, and sold in lots, to suit purchasers.
Chairs, Spikes, and Fish Joints for same.

For Sale BY DANA & COMPANY, (P. O. Box 5490.) 18 WILLIAM STREET, NEW YORK.

Light Locomotives for use in Collieries, Mines, etc.
march 6 1y